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EatingWell®

OCTOBER 2019

45 EASY & DELICIOUS RECIPES

THE FUTURE OF FOOD

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Kernza, a new type of perennial wheat *(on the right)*, puts down deep roots that can mitigate soil loss and pull more carbon out of the atmosphere than traditional annual wheat *(on the left)*. Read about it on page 70.

COVER: THE VOORHES; THIS PAGE: ©THE LAND INSTITUTE

DEPARTMENTS

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MAREN CARUSO; STYLING: ALICIA DEAL

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LIVING WELL ON THE ROAD

FROM BUSINESS TRAVEL TO RESTORATIVE GETAWAYS, maintaining a healthy lifestyle while you're away can be a breeze. All it takes is planning, preparation, and a hotel that supports your lifestyle, like one of Westin Hotels & Resorts' 230 worldwide locations. Cassandra Bodzak, healthy eating and living expert, shares her secrets to living well and maintaining her routine on the road.

CATCH YOUR ZZZZs

Changes in routine and time zones often interfere with a good night's sleep, says Bodzak, author of *Eat with Intention: Recipes and Meditations for a life that Lights You Up*. Research shows that sleep-deprived travelers have bigger appetites and are less able to withstand the call of unhealthy treats. And sleep studies show the negative effects of even minor levels of sleep deprivation. To ensure a sublime rest, Bodzak recommends sticking to bedtime routines. "My nighttime rituals include reading and sipping a cup of soothing herbal tea," she says. "I also bring a lavender spray from home." Indeed, scents are a powerful relaxant, and Westin's **Sleep Well Lavender Balm** is geared toward helping your body wind down. Being able to rely on a comfortable bed is also important. Westin features their signature **Heavenly® Bed** in every room, at every one of their locations worldwide. "I always look for a hotel that I know will give me a calm place to unwind," says Bodzak.

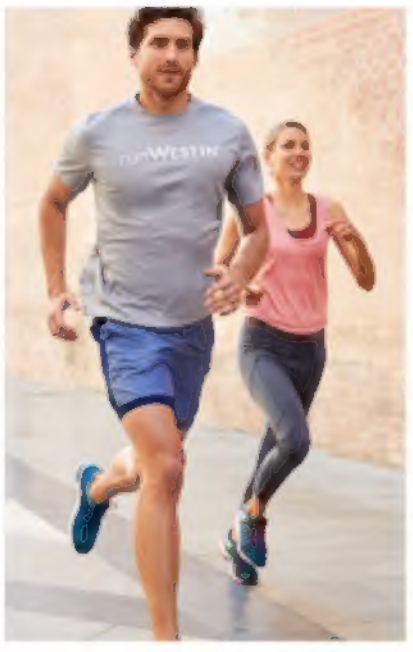
INDULGE IN GOODNESS

Bring your good eating habits with you. "If I don't stick to a healthy eating routine while traveling, I may have stomach problems, and may even lose a day adjusting," says Bodzak. To fuel up for long travel days and speaking engagements, Bodzak always starts with a good breakfast, like a smoothie or veggie omelet, and brings along protein-rich snacks, like those available at Westin: poached eggs, Greek yogurt, or fresh fruit. "When I'm traveling for business, I'm even more careful with how I eat," she says. "Up on stage, there's no wiggle room for me not to feel my best." That's when a hotel that has healthy options is a lifesaver. Westin's **Eat Well Menu** includes healthy, flexibly portioned dishes and snacks. Breakfast options include coconut-chia pudding, seasonal fruit and berries, eggs, and fresh smoothies. When she needs a pick-me-up, Bodzak indulges in healthy treats like an acai bowl or fruit-based sorbet. "Whether at my hotel or at a cool local café, I can always find some fun, yet healthy options."

GET MOVING

It's tempting to leave your fitness routine at home. But don't do it, Bodzak warns. Studies show that exercise regulates your mood and your energy level, and makes it easier to stick to a healthy eating plan. According to Bodzak, the best way to work fitness into your travel plans is by combining exploration with activity; her recent travels included hiking in Hawaii and biking in Copenhagen. "I also explore the area around my hotel," she says. Westin provides scenic local running maps and features a unique **Gear Lending Program** that allows you to borrow workout shoes and clothing during your stay. "Just keep moving and enjoy," Bodzak says. "Eating well, sleeping well, and waking up refreshed goes a long way toward living well."

To see how Westin can help you maintain your wellness routines while traveling, visit **Westin.com**.



From top: Avocado Toast, as featured on Westin's Eat Well Menu; Westin's signature Heavenly Bed; Westin's Run Concierge leads a group run; Cassandra Bodzak, healthy living and eating expert.

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Follow me on Instagram @jessieeatswell to see how we bring this issue to life at a special event in New York City on September 18.

BRETT SIMISON

This October issue is different. We devoted nearly half of our pages to covering how food is likely to change in the not-too-distant future. The stories touch on a range of topics, including how gene editing may deliver food that's more abundant and nutritious and has a lighter impact on the planet. What's that grumble I hear? GMOs aren't the way to get you excited about this issue? Hear me out. Whether you like it or not, foods that appear perfectly normal (they might even look like the tomato on our cover), developed using the next-generation, more sophisticated genetic modification technique known as CRISPR, will be at your local supermarket very soon. And the net effect of this CRISPR technology on our food supply may end up being overwhelmingly positive, as Rowan Jacobsen reports on page 74.

This is just one of the surprising changes our feature stories preview. We also dive into breakthroughs in nutrition that may do some wild stuff, including track what we eat via sensors *inside* your body. (Creepy? Or cool?!) We take a look at emerging kitchen technologies *(page 83)*, how smarter, cleaner fish farming can supply a growing global population *(page 94)* and how turning wheat from an annual crop to a perennial may help clear huge amounts of CO_2 from the atmosphere *(page 70)*.

With all these amazing changes on the horizon, and given *EatingWell*'s ongoing focus on where our food comes from, we figured now's the time to take a breather from our typical recipe features and dive into the future of food. Our team began working on this issue a year and a half ago. We brainstormed, researched, scoured for stories, talked to experts and enlisted top-notch writers. The resulting pages have given me a ton to think about and look forward to. Flip to page 65 to start reading. I'm excited to hear your thoughts. Email me at *editor@eatingwell.com* or share your input on an ongoing basis by joining our Meredith Voices panel at *eatingwell.com/meredithvoices*.

A final note: We appreciate how important *today* is for you and know that delicious dinners, even on busy nights, are nonnegotiable. So, our expanded *Dinner Tonight* section *(page 13)* is packed with 32 quick recipes. Once I get through the last of the summer tomatoes and corn, I'll be embracing the change of season and making the roasted butternut squash salad with piquillo peppers, goat cheese and toasted pecans from chef Steve McHugh.

Jessie

JESSIE PRICE
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Trick-or-Treat

Hilaria Baldwin—yoga pro, mom of four and wife of actor Alec Baldwin—talks family Halloween costumes, candy rules, pumpkin recipes and more.

What candy do you steal from your kids' bags?

"Sour Patch Kids! The yellow, green and blue ones are my favorites."
—Hilaria Baldwin

THE GOOD-LIFE GURU Q&A

What are your favorite Halloween traditions?
"Out here in the Hamptons, there's this place called Hank's Pumpkintown that the kids [Carmen, 6, Rafael, 4, Leonardo, 3, and Romeo, 1] go *crazy* for. They have a train, fun little mazes, and we get our pumpkins there. Then for trick-or-treating, the kids wear two costumes. One is to their school or preschool. And then—I assume one year they'll stop going for it—they've been into doing a group dress-up thing. We did the Wizard of Oz one year and The Incredibles another year. Last year we were astronauts. I'm going to eat it up until they stop wanting to do that with us!"

How do you and Alec handle Halloween candy with your kids?
"Typically our children get to have a dessert after dinner. On actual Halloween they'll have one piece of candy. And when it comes to desserts the next day and the day after, they get to choose: 'Do I want Halloween candy? Or do I want to have Bunny Grahams or a little bit of ice cream?' Whatever they want I'll let them have that, in very small amounts."

Do you have any favorite pumpkin recipes?
"My stepdaughter, Ireland, came over one of the past Halloweens, and she and her friends carved pumpkins and roasted the seeds. She put cinnamon and sugar on some and Hawaiian pink sea salt on the others. They were so delicious! Around Halloween and Thanksgiving, I'll also blend either roasted pumpkin or squash with some sea salt, olive oil or a little bit of butter and make a mash of it."

What do you eat to stay fueled on your busiest days?
"I'm a big believer that you should have a meal when you can be present for it. Alec and I, we'll eat together almost every single night. And that either means having date night—after I put the kids to bed we go out to a little restaurant nearby—or we're staying home and literally having cereal for dinner. As I'm running around throughout the day, I'll do a lot of snacking—things like kale chips, Health Warrior bars. I'm always stocked up."

Which yoga pose helps you recharge?
"The thing I've learned from teaching yoga for so many years is that we all hold our stress in different ways. One of the perfect sequences is the Sun Salutation. Not only are you stretching out and focusing on your breath, but you're also getting your body to move a little bit."

Read the full Q&A at *eatingwell.com/Hilaria*.

Hover your phone's camera over this smart code to get our best ideas for food-themed Halloween costumes!

WE ASKED YOU

Do you hand out anything other than candy for Halloween?

"So many people have food allergies now that I always buy noncandy items. **Stickers, temporary tattoos, glow sticks and little toys** are incredibly popular." *—Elisa Crossman*

"I pass out **Capri Suns**. It's a win every year!" *—Shelley Smallwood*

"We give **whole candy bars** out and the kids love it!! It's once a year... I'm 45 and still roll my eyes when I think of a local dentist that used to give out toothbrushes for Halloween." *—Brittany Womack Woodward*

"**Mini toothpaste** and **floss**." *—Claire Parrella*

"I give **crayons or markers** and the kids are always happy." *—Rose Ann Pedaci*

"I gave out **raisins** once and kids threw them at the house." *—Anne Jerome*

"My dad started passing out **Cutie oranges** with pumpkin faces drawn on them. We gave two options (mini oranges or mini candy bars). I was really surprised that most kids took the oranges. *—RoMay Allen*

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Juicy News That purple pigment so deep and lush it's almost black? It comes courtesy of anthocyanins—phytonutrients that give blackberries their beautiful hue *and* some major health benefits. In a recent study published in the journal *Nutrients*, overweight men who ate about 4 cups of blackberries a day for a week had improved insulin function. Insulin is a hormone that regulates blood sugar, and when it's out of whack, it's linked to type 2 diabetes, heart disease, nonalcoholic fatty liver disease and even dementia. (Granted, you're probably not eating 4 servings of these fruits at a time, but it does make a compelling case for enjoying plenty of purples.) And balanced blood sugar may have skin-deep pluses too. University of California, Davis researchers report that anthocyanins may help reduce moderate breakouts—because in-check insulin levels seem to decrease acne-promoting hormone production. Choose berries at their ripest. Studies show they have 43% more anthocyanins than their puckery counterparts. Sweet! —*Julia Westbrook*

"Blackberries happen to be my favorite fruit and I just wanted to fill the frame with the berry," says San Francisco-based food photographer **Maren Caruso,** who also shot the images in our *Good. Food. Fast.* section. "Common objects take on a whole new personality when shot this way. You see and learn things that you never knew were there."

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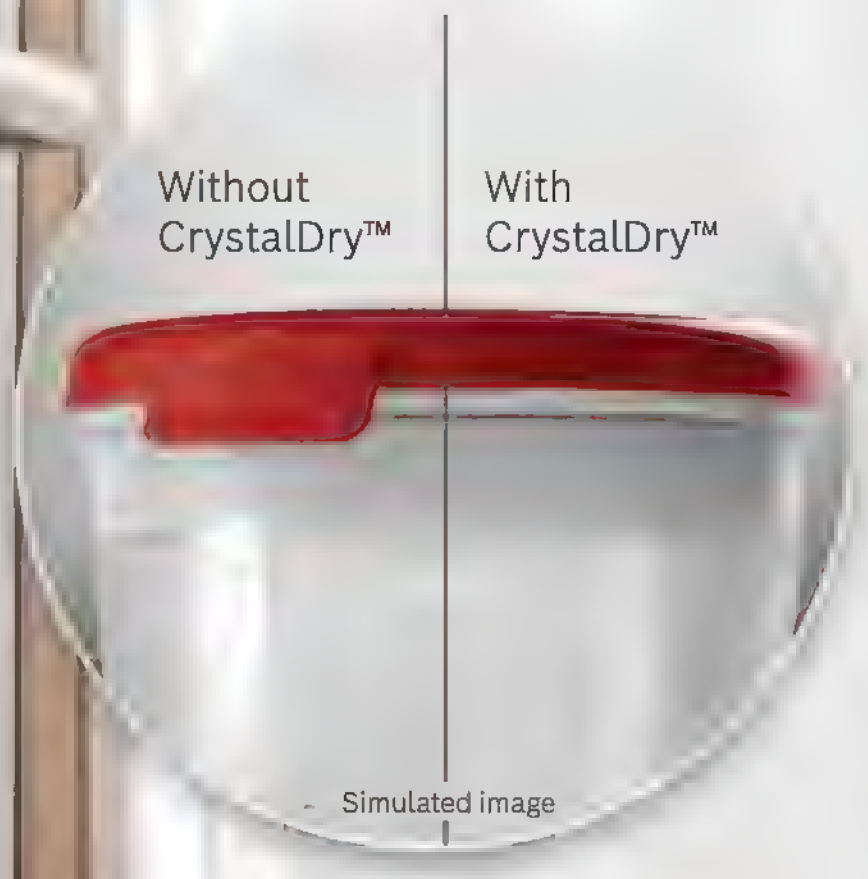

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EASY HEALTHY RECIPES

DINNER TONIGHT

Butternut Squash & Piquillo Pepper Salad

Everyday Elevated

Tossing together a few homemade goodies—like the pickled celery and whipped goat cheese in this salad—spins simple dishes into stunners! Turn for more fast fixes to take weeknight dinners up a notch.

Butternut Squash & Piquillo Pepper Salad

ACTIVE: 50 min **TOTAL:** 1 hr 10 min

TO MAKE AHEAD: Refrigerate pickled celery, roasted squash and the goat cheese mixture separately for up to 1 day.

Sour celery pickles, tangy goat cheese, spicy peppers and sweet squash seasoned with fragrant coriander and cumin create a flavor explosion for a tasty alternative to leafy green salads.

- 1½ cups water, divided
- ½ cup rice vinegar
- 2 tablespoons chopped jalapeño pepper
- 2 tablespoons sugar
- 1 tablespoon kosher salt plus ¾ teaspoon, divided
- 1 teaspoon grated fresh ginger
- 1 teaspoon yellow mustard seeds
- 2 stalks celery, cut into ½-inch pieces
- 8 cups cubed (1-inch) peeled butternut squash
- 6 tablespoons extra-virgin olive oil, divided
- 1 tablespoon ground coriander
- 1 tablespoon ground cumin
- 2 tablespoons red-wine vinegar
- 1½ teaspoons whole-grain mustard
- 1 teaspoon honey
- 1 clove garlic, grated
- ½ teaspoon ground pepper, divided
- 1 10-ounce jar piquillo peppers, rinsed and sliced
- 4 ounces goat cheese
- 1 cup toasted pecans, chopped
- 1 cup fresh cilantro

1. Combine 1 cup water, rice vinegar, jalapeño, sugar, 1 tablespoon salt, ginger and mustard seeds in a small saucepan. Bring to a simmer over medium-high heat. Place celery in a heatproof bowl and pour the vinegar mixture over it. Let stand at room temperature for 1 hour. Drain, reserving the celery, jalapeño and mustard seeds.

2. Meanwhile, preheat oven to 350°F and line a rimmed baking sheet with parchment paper.

3. Toss squash, 2 tablespoons oil, coriander, cumin and ¼ teaspoon salt in a large bowl. Transfer to the prepared pan and roast, stirring once, until tender, about 30 minutes.

4. Whisk red-wine vinegar, mustard, honey, garlic, the remaining 4 tablespoons oil and ¼ teaspoon each salt and pepper in the large bowl. Add the squash and peppers; stir to coat.

5. Whisk goat cheese, the remaining ⅓ cup water and ¼ teaspoon each salt and pepper in a small bowl until smooth. Spread the mixture on a serving platter and top with the squash, celery, jalapeño, mustard seeds, pecans and cilantro.

SERVES 8: about 1 cup each

CAL 289 / **FAT** 23G (SAT 4G) / **CHOL** 7MG / **CARBS** 18G
TOTAL SUGARS 4G (ADDED 1G) / **PROTEIN** 6G / **FIBER** 6G
SODIUM 421MG / **POTASSIUM** 437MG.

STEVE McHUGH'S restaurant Cured is named after its specialty—charcuterie—but also to commemorate the chef's recovery from lymphoma. The San Antonio eatery isn't just for meat-lovers; it offers a menu of dishes (including vegetarian options) that showcase ingredients that benefit the body—like the black pepper, squash and pecans in this salad, which can help fight inflammation.

LEIGH BEISCH; STYLING: EMILY CANEER (FOOD); GLENN JENKINS (PROPS); JOSH HUSKIN (INSET)

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Sometimes all it takes is a dip to get kids to eat their veggies. Serve this onion-ring-inspired recipe with Heinz Simply Tomato Ketchup (made with real cane sugar) for dunking.

Scan here for more mealtime wins from Heinz Simply Ketchup.

Spiralized Onions with Crispy Parmesan Breadcrumbs

ACTIVE: 15 min **TOTAL:** 45 min
EQUIPMENT: Spiralizer

You may not have considered onions as candidates for the spiralizer, but you should. They create beautiful ribbons that make this recipe reminiscent of fried shoestring onions.

- **2 large onions (about 2 pounds), peeled**
- **2 tablespoons extra-virgin olive oil**
- **3 slices whole-grain country bread, lightly toasted**
- **¼ cup grated Parmesan cheese**
- **½ teaspoon ground pepper**
- **½ teaspoon salt, divided**
- **¼ teaspoon cayenne pepper**

1. Position racks in upper and lower thirds of oven; preheat to 425°F. Coat 2 large rimmed baking sheets with cooking spray.
2. Using a vegetable spiralizer, cut onions into long thin strands. Place in a large bowl and toss with oil.
3. Pulse bread in a food processor into crumbs. Add to the onions along with Parmesan, pepper, ¼ teaspoon salt and cayenne; toss to coat. Divide between the prepared pans.
4. Bake, stirring once halfway through and rotating the pans from top to bottom and back to front, until browned in spots, 25 to 30 minutes. Sprinkle with the remaining ¼ teaspoon salt and serve hot.

SERVES 8: ½ cup each
CAL 102 / **FAT** 5G (SAT 1G) / **CHOL** 2MG / **CARBS** 13G
TOTAL SUGARS 4G (ADDED 0G) / **PROTEIN** 3G
FIBER 2G / **SODIUM** 231MG / **POTASSIUM** 154MG.

PICKY EATERS EDITION

Roasted Beets with Caraway & Crème Fraîche

ACTIVE: 25 min **TOTAL:** 45 min
EQUIPMENT: Parchment paper

Caraway, dill and vinegar turn beets into a borscht-inspired side.

- **1¼ pounds medium beets, peeled and cut into ¾-inch pieces**
- **4 tablespoons extra-virgin olive oil, divided**
- **¼ teaspoon salt plus ⅛ teaspoon, divided**
- **½ teaspoon ground pepper, divided**
- **1 teaspoon caraway seeds**
- **¼ cup minced carrot**
- **¼ cup minced shallot**
- **3 tablespoons red-wine vinegar**
- **¼ cup crème fraîche**
- **1 tablespoon chopped fresh dill**

1. Preheat oven to 400°F. Line a rimmed baking sheet with parchment paper.
2. Toss beets with 1½ teaspoons oil and ¼ teaspoon each salt and pepper in a medium bowl. Transfer to the prepared pan. Roast, stirring once halfway, until tender, 30 to 35 minutes.
3. Meanwhile, toast caraway seeds in a small saucepan over medium-low heat until fragrant, about 2 minutes. Transfer to a medium bowl. Add 1½ teaspoons oil, carrot and shallot to the pan. Cook, stirring occasionally, until very soft, 5 to 7 minutes. Stir in vinegar and remove from heat. Stir into the caraway seeds and slowly whisk in the remaining 3 tablespoons oil, ⅛ teaspoon salt and ¼ teaspoon pepper.
4. Toss the beets with the dressing. Serve topped with crème fraîche and dill.

SERVES 4: ½ cup each
CAL 230 / **FAT** 19G (SAT 5G) / **CHOL** 11MG / **CARBS** 12G
TOTAL SUGARS 7G (ADDED 0G) / **PROTEIN** 2G
FIBER 3G / **SODIUM** 308MG / **POTASSIUM** 379MG.

BRIE PASSANO; STYLING: KELSEY BULAT (FOOD), SUE MITCHELL (PROPS); RECIPES BY BREANA KILLEEN, ADAM DOLGE

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Sautéed Chard with Lemon & Anchovy

ACTIVE: 30 min **TOTAL:** 30 min

Caesar salad, croutons and all, meets sautéed chard.

1 pound white chard, trimmed
2 tablespoons extra-virgin olive oil, divided
1 slice whole-grain bread, cut into ½-inch cubes
1 tablespoon minced garlic
Pinch of salt
1 tablespoon lemon juice
1 tablespoon mayonnaise
½ teaspoon anchovy paste *or* 1 anchovy fillet, minced
¼ teaspoon ground pepper
1 tablespoon shaved Parmesan cheese

1. Separate chard leaves from stems; chop the stems and coarsely chop the leaves.

2. Heat 1 tablespoon oil in a large skillet over medium-high heat. Add bread; cook, stirring, until browned and crisp, 3 to 4 minutes. Transfer to a plate.

3. Reduce heat to medium. Add the remaining 1 tablespoon oil and the chard stems to the pan and cook, stirring, until softened, about 5 minutes. Add garlic and cook, stirring, until fragrant, about 1 minute. Stir in the chard leaves and salt; cover and cook, stirring occasionally, until tender, about 5 minutes more. Remove from heat.

4. Combine lemon juice, mayonnaise, anchovy and pepper in a small bowl. Stir the sauce into the chard. Serve topped with the croutons and Parmesan.

SERVES 4: ⅔ cup each

CAL 106 / **FAT** 8G (SAT 1G) / **CHOL** 2MG / **CARBS** 6G / **TOTAL SUGARS** 1G (ADDED 0G) / **PROTEIN** 3G / **FIBER** 2G / **SODIUM** 260MG / **POTASSIUM** 466MG.

BLAINE MOATS; STYLING: SUE HOSS (FOOD), SUE MITCHELL (PROPS); RECIPE BY CAROLYN CASNER

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Mashed Cauliflower & Yukon Golds

ACTIVE: 10 min **TOTAL:** 30 min

Yukon Golds add to the buttery hue of this mash and their waxy texture balances out the more watery cauliflower to keep it velvety.

- **1 pound Yukon Gold potatoes, peeled and cut into 1-inch pieces**
- **1 pound cauliflower florets (1 head)**
- **3 tablespoons sour cream**
- **2 tablespoons butter, softened**
- **1 teaspoon kosher salt**
- **¼ teaspoon ground pepper**
- **1 tablespoon finely chopped fresh chives**

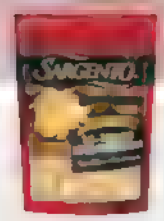
1. Place potatoes and cauliflower in a medium saucepan and cover with cold water. Bring to a boil over high heat. Reduce heat to medium and simmer until tender, about 18 minutes. Drain and return the vegetables to the pan. Cook over medium-high heat, stirring often, until dry, about 3 minutes.

2. Mash the vegetables with a potato masher. Add sour cream and butter and mash until mostly smooth. Stir in salt and pepper. Transfer to a large serving bowl and sprinkle with chives.

SERVES 6: ¾ cup each

CAL 77 / **FAT** 3G (SAT 2G) / **CHOL** 8MG / **CARBS** 11G / **TOTAL SUGARS** 1G (ADDED 0G) / **PROTEIN** 2G / **FIBER** 2G / **SODIUM** 211MG / **POTASSIUM** 399MG.

JOHNNY AUTRY; STYLING: CHARLOTTE AUTRY; RECIPE BY ADAM DOLGE



GET IT
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Linguine with Creamy Mushroom Sauce

ACTIVE: 40 min **TOTAL:** 40 min

Here's an excuse to buy wild mushrooms, available at many grocery stores these days. Or if you prefer white buttons, those will work well too.

- **8 ounces whole-wheat linguine pasta**
- **2 tablespoons extra-virgin olive oil**
- **6 cloves garlic, sliced**
- **1½ pounds mixed mushrooms, sliced**
- **1 cup diced shallots**
- **1 tablespoon chopped fresh thyme**
- **1 cup dry white wine**
- **½ cup sour cream *or* crème fraîche**
- **¼ cup grated Parmesan cheese plus more for garnish**
- **1 tablespoon butter**
- **½ teaspoon salt**
- **¼ teaspoon ground pepper**
- **Finely chopped fresh parsley for garnish**

1. Bring a large pot of water to a boil over high heat. Cook pasta according to package directions. Reserve ½ cup of the pasta water, then drain the pasta.

2. Meanwhile, heat oil and garlic in a large skillet over medium heat until fragrant, about 2 minutes. Add mushrooms, shallots and thyme and increase heat to high. Cook, stirring occasionally, until the liquid the mushrooms release has evaporated and the mushrooms are starting to brown, 11 to 13 minutes.

3. Add wine to the pan and cook until it is reduced by about half, about 3 minutes. Stir in the reserved pasta water, sour cream (or crème fraîche), Parmesan, butter, salt and pepper. Add the pasta and toss to coat. Serve topped with more Parmesan and parsley, if desired.

SERVES 4: 1½ cups each

CAL 479 / **FAT** 18G (SAT 6G) / **CHOL** 26MG / **CARBS** 59G **TOTAL SUGARS** 8G (ADDED 0G) / **PROTEIN** 17G **FIBER** 7G / **SODIUM** 409MG / **POTASSIUM** 1,026MG.

BRIE PASSANO; STYLING: KELSEY BULAT (FOOD), SUE MITCHELL (PROPS); RECIPE BY CAROLYN MALCOUN

Make Sargento caramelized leek and prosciutto pizza

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Buttermilk Fried Tofu with Smoky Collards

ACTIVE: 25 min **TOTAL:** 25 min

Dipping tofu in buttermilk makes the coating stick for a crispy tofu, reminiscent of fried chicken. Spicing up the collards with paprika coats them with smoky flavor while keeping this dish vegetarian.

- **6 tablespoons grapeseed *or* canola oil, divided**
- **1 16-ounce package chopped collards**
- **½ cup water**
- **1 tablespoon cider vinegar**
- **½ teaspoon smoked paprika**
- **¾ teaspoon salt, divided**
- **1 14- to 16-ounce package extra-firm tofu, drained**
- **1 cup buttermilk**
- **½ teaspoon garlic powder**
- **½ teaspoon onion powder**
- **¼ teaspoon cayenne pepper**
- **1 cup whole-wheat panko**
- **Hot (spicy) honey for serving**

1. Heat 1 tablespoon oil in a large pot over medium heat. Add collards and water; cover and cook, stirring occasionally, until soft and wilted, about 8 minutes. Remove from heat and stir in vinegar, paprika and ½ teaspoon salt. Cover to keep warm.

2. Meanwhile, cut tofu crosswise into 8 equal pieces. Blot with paper towels to remove excess water. Whisk buttermilk, garlic powder, onion powder and cayenne in a 7-by-11-inch baking dish. Add the tofu and turn to coat. Let stand, turning once, for 5 minutes.

3. Place panko on a plate. Dredge the tofu in the panko, coating both sides.

4. Heat 3 tablespoons oil in a large nonstick skillet over medium-high heat. Add the tofu and cook until brown and crispy on one side, 4 to 5 minutes. Turn the tofu over and drizzle in the remaining 2 tablespoons oil. Cook until browned on the other side, about 4 minutes more.

5. Sprinkle the tofu with the remaining ¼ teaspoon salt and serve with the collards and hot honey, if desired.

SERVES 4: 2 pieces tofu & 1 cup collards each
CAL 366 / **FAT** 27G (SAT 3G) / **CHOL** 1MG / **CARBS** 20G **TOTAL SUGARS** 2G (ADDED 0G) / **PROTEIN** 17G **FIBER** 7G / **SODIUM** 518MG / **POTASSIUM** 414MG.

BRIE PASSANO; STYLING: KELSEY BULAT (FOOD), SUE MITCHELL (PROPS); RECIPE BY BREANA KILLEEN

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Chipotle-Glazed Pork Tenderloin with Roasted Grapes

ACTIVE: 25 min **TOTAL:** 35 min

Grape jelly with its sweet, fruity flavor matches with the smoke and heat of chipotle to season this pork.

- **2 tablespoons grape jelly**
- **1 tablespoon minced canned chipotles in adobo sauce**
- **2 tablespoons extra-virgin olive oil, divided**
- **1 pound pork tenderloin, trimmed**
- **½ teaspoon salt plus ⅛ teaspoon, divided**
- **2 cups red grapes**
- **⅛ teaspoon ground pepper**
- **¼ cup dry white wine**
- **Sliced scallions for garnish**

1. Preheat oven to 450°F.

2. Whisk grape jelly and chipotles in a small bowl.

3. Heat 1 tablespoon oil in a large ovenproof skillet over medium-high heat. Sprinkle pork with ½ teaspoon salt, add to the pan and cook until browned on all sides, 5 to 8 minutes total. Remove from heat; brush with the jelly mixture.

4. Toss grapes in a large bowl with the remaining 1 tablespoon oil, ⅛ teaspoon salt and pepper. Add to the pan, transfer to the oven and roast until an instant-read thermometer inserted in the thickest part of the pork registers 145°F and the grapes are slightly crisp but still soft and juicy inside, 13 to 17 minutes. Transfer the pork to a cutting board and the grapes to a serving platter.

5. Place the pan over medium heat. Add wine and cook, scraping up any browned bits, until the sauce thickens, about 3 minutes. Slice the pork and arrange with the grapes on a platter. Top with the sauce and scallions, if desired.

SERVES 4: 3 oz. pork, ½ cup grapes & 1 Tbsp. sauce each

CAL 280 / **FAT** 10G (SAT 2G) / **CHOL** 61MG / **CARBS** 22G **TOTAL SUGARS** 19G (ADDED 6G) / **PROTEIN** 23G **FIBER** 1G / **SODIUM** 434MG / **POTASSIUM** 520MG.

LEIGH BEISCH; STYLING: EMILY CANEER (FOOD), GLENN JENKINS (PROPS); RECIPE BY BREANA KILLEEN

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Alcon

Butternut Squash Soup with Apple Grilled Cheese Sandwiches

ACTIVE: 30 min **TOTAL:** 45 min

TO MAKE AHEAD: Refrigerate soup (Steps 1-2) for up to 3 days.

Layering apple slices into these sandwiches adds a little crunch to a favorite soup dipper.

- **2 tablespoons grapeseed *or* coconut oil, divided**
- **1 cup chopped onion**
- **2 tablespoons minced fresh ginger**
- **1 teaspoon ground cumin**
- **1 teaspoon ground turmeric**
- **¼ teaspoon cayenne pepper, plus more for garnish**
- **5 cups cubed (1-inch) peeled butternut squash**
- **1 15-ounce can light coconut milk, divided**
- **2 cups low-sodium no-chicken broth *or* chicken broth**
- **1 small apple, thinly sliced, divided**
- **¾ teaspoon salt**
- **1 tablespoon lime juice**
- **4 slices whole-wheat country bread**
- **1 cup shredded smoked Gouda *or* Cheddar cheese**
- **Ground pepper for garnish**

1. Heat 1 tablespoon oil in a large saucepan over medium heat. Add onion and ginger; cook, stirring, until starting to soften, about 3 minutes. Add cumin, turmeric and cayenne; cook, stirring, for 30 seconds. Add squash, coconut milk (reserve 4 tablespoons for garnish, if desired), broth, half the apple slices and salt. Bring to a boil. Reduce the heat to maintain a simmer and cook, stirring occasionally, until the squash is tender, about 20 minutes. Stir in lime juice. Remove from heat.

2. Puree the soup in the pan using an immersion blender or in batches in a blender. (Use caution when blending hot liquids.)

3. Divide ½ cup cheese between 2 slices of bread. Top with the remaining apple slices, cheese and bread. Heat the remaining 1 tablespoon oil in a large nonstick skillet over medium heat. Add the sandwiches and cook until lightly browned on both sides and the cheese is melted, about 2 minutes per side. Cut in half. Garnish the soup with the reserved coconut milk, more cayenne and ground pepper, if desired.

SERVES 4: 1½ cups soup & ½ sandwich each
CAL 419 / **FAT** 23G (SAT 11G) / **CHOL** 26MG / **CARBS** 43G **TOTAL SUGARS** 10G (ADDED 0G) / **PROTEIN** 13G **FIBER** 8G / **SODIUM** 827MG / **POTASSIUM** 622MG.

BRIE PASSANO; STYLING: KELSEY BULAT (FOOD), SUE MITCHELL (PROPS); RECIPE BY BREANA KILLEEN

→ Find everything you need to make healthy soup all season long at *eatingwell.com/soupguide*

GOLDEN

Bright yellow turmeric has been used for centuries in traditional Indian medicine. The earthy spice's potent antioxidant and anti-inflammatory compound, curcumin, shows promise in fighting certain cancers, including breast, pancreatic, colorectal, lung and prostate.

Golden Milk-Poached Chicken & Chickpea Salad with Broccoli

ACTIVE: 25 min **TOTAL:** 40 min

TO MAKE AHEAD: Refrigerate chicken and dressing (Steps 1 & 2) separately for up to 2 days.

Poaching chicken in turmeric-infused milk yields tender results with a golden hue. Don't toss the cooking liquid: some of it goes into the salad dressing and you can use what remains to cook grains or as a soup base. Make sure to use whole milk and don't go beyond a bare simmer, otherwise it may curdle.

- **2 cups whole milk**
- **1 tablespoon ground coriander**
- **1 tablespoon ground cumin**
- **1 tablespoon ground turmeric**
- **2 large cloves garlic, crushed**
- **1½ teaspoons salt, divided**
- **1 pound boneless, skinless chicken breasts, trimmed**
- **1 15-ounce can chickpeas, rinsed**
- **¼ cup extra-virgin olive oil**
- **3 tablespoons red-wine vinegar**
- **1 5-ounce package baby arugula**
- **4 cups bite-size broccoli florets**
- **¼ cup fresh cilantro**

1. Whisk milk, coriander, cumin, turmeric, garlic and 1 teaspoon salt in a large saucepan. Bring to a simmer over medium heat. Add chicken and chickpeas. Adjust heat to maintain a bare simmer and cook, partially covered and turning the chicken occasionally, until an instant-read thermometer inserted in the thickest part registers 165°F, about 20 minutes.

2. Transfer the chicken to a clean plate and cover to keep warm. Pour the poaching liquid through a fine-mesh strainer set over a medium heatproof bowl. Transfer ¼ cup of the liquid and the garlic to a mini food processor. Add oil, vinegar and the remaining ½ teaspoon salt. Process the dressing until smooth.

3. Slice or shred the chicken and combine in a large bowl with the chickpeas, arugula, broccoli and cilantro. Toss with the dressing.

SERVES 4: 3 cups each

CAL 371 / **FAT** 19G (SAT 3G) / **CHOL** 66MG / **CARBS** 19G **TOTAL SUGARS** 5G (ADDED 0G) / **PROTEIN** 31G **FIBER** 6G / **SODIUM** 642MG / **POTASSIUM** 665MG.

LEIGH BEISCH; STYLING: EMILY CANEER (FOOD), GLENN JENKINS (PROPS); RECIPE BY BREANNA KILLEEN

→ Find more salad recipes featuring autumn produce at eatingwell.com/fallsalad

GARBANZO GOODIES

Chickpea flour adds nuttiness and bumps up the nutrition of these dumplings: they boast 2 grams more fiber per serving than dumplings made with all-purpose flour. Look for it with the other specialty flours at well-stocked supermarkets or natural-foods stores.

Chickpea Dumplings in Curried Tomato Sauce

ACTIVE: 30 min **TOTAL:** 45 min

Inspired by a dish served in Pakistan, Afghanistan and India called dharan ji kadhi, *our rendition studs the tender chickpea-flour dumplings with chiles and greens. Serve with naan to sop up the sauce.*

- **1 cup plus 2 tablespoons garbanzo bean (chickpea) flour**
- **4 cups finely chopped mustard greens *or* spinach, divided**
- **⅓ cup canola oil plus 2 tablespoons, divided**
- **¼ cup finely chopped red onion**
- **¼ cup whole-milk plain yogurt**
- **¼ cup finely chopped serrano *or* jalapeño pepper**
- **½ teaspoon salt plus ⅛ teaspoon, divided**
- **2 teaspoons coriander seeds**
- **1 teaspoon cumin seeds**
- **1 teaspoon mustard seeds**
- **1 tablespoon curry powder**
- **1 tablespoon minced fresh ginger**
- **1 15-ounce can no-salt-added petite diced tomatoes**
- **1 15-ounce can no-salt-added tomato sauce**

1. Mix flour, ½ cup greens, ⅓ cup oil, onion, yogurt, serrano (or jalapeño) and ½ teaspoon salt in a large bowl. Using 1 tablespoon to make each, shape into 16 dumplings.

2. Heat the remaining 2 tablespoons oil in a large skillet over medium-high heat. Add coriander, cumin and mustard seeds; cover and cook until they start to pop, about 30 seconds. Stir in curry powder and ginger, then add tomatoes and their juice and tomato sauce; stir to combine. Stir in the remaining 3½ cups greens and ⅛ teaspoon salt. Bring to a simmer.

3. Nestle the dumplings into the sauce, cover and cook, turning the dumplings over and basting with the sauce occasionally, until tender, about 20 minutes.

SERVES 4: 4 dumplings & ¾ cup sauce each
CAL 454 / **FAT** 29G (SAT 2G) / **CHOL** 2MG / **CARBS** 41G **TOTAL SUGARS** 13G (ADDED 0G) / **PROTEIN** 12G **FIBER** 13G / **SODIUM** 438MG / **POTASSIUM** 805MG.

LEIGH BEISCH; STYLING: EMILY CANEER (FOOD), GLENN JENKINS (PROPS); ILLUSTRATION: EMMA DIBBEN; RECIPE BY CAROLYN MALCOUN

COZI

Get *EatingWell* recipes for easy weeknight & 20-minute mains in Cozi, a free meal-planning & organizing app (available on iTunes and Google Play) from our parent company, Meredith Corporation.

Penne with Sausage, Squash & Chard

ACTIVE: 35 min **TOTAL:** 35 min

Get dinner on the table even faster by using pre-cubed squash in this creamy pasta. Found in the produce section of large grocery stores, the cut butternut is a little bigger than you need here, so you will have to do some chopping—but the peeling and gutting has been done for you. Score!

- **8 ounces whole-wheat penne**
- **2 cups diced butternut squash (½-inch pieces)**
- **4 cups lightly packed chopped chard**
- **1 cup diced smoked sausage**
- **½ cup finely chopped shallot**
- **2 tablespoons butter**
- **1 tablespoon chopped fresh sage**
- **2 tablespoons all-purpose flour**
- **2 cups low-fat milk**
- **1 cup freshly grated pecorino cheese, plus more for serving**
- **½ teaspoon salt**
- **Pinch of freshly grated nutmeg**
- **Crushed red pepper flakes for garnish**

1. Bring a large pot of water to a boil. Add pasta and cook for 2 minutes. Add squash and cook for 6 minutes. Add chard and cook until the pasta is tender, 1 to 2 minutes more. Drain and return to the pot.

2. Meanwhile, combine sausage, shallot and butter in a large saucepan over medium heat. Cook, stirring occasionally, until the shallot is soft, about 5 minutes. Add sage and sprinkle with flour; cook, stirring, for 1 minute. Whisk in milk and cook, whisking occasionally, until the sauce starts to thicken, about 5 minutes. Stir in cheese, salt and nutmeg; cook until the cheese melts and the sauce is thick.

3. Pour the sauce over the pasta mixture and stir to coat. Serve topped with more cheese and pepper flakes, if desired.

SERVES 6: 1½ cups each

CAL 340 / **FAT** 13G (SAT 7G) / **CHOL** 35MG / **CARBS** 42G
TOTAL SUGARS 7G (ADDED 0G) / **PROTEIN** 13G
FIBER 6G / **SODIUM** 678MG / **POTASSIUM** 429MG.

BLAINE MOATS; STYLING: KELSEY BULAT (FOOD), SUE MITCHELL (PROPS); RECIPE BY CAROLYN MALCOUN

Lemon-Garlic Chicken with Green Beans

ACTIVE: 20 min **TOTAL:** 20 min

Chicken cutlets cook in less than 10 minutes! Can't find them? Make your own from chicken breasts. Place each breast on a cutting board and, with your knife parallel to the board, slice into the skinny side of the chicken breast in a single smooth motion.

- **1 pound chicken breast cutlets**
- **1 teaspoon salt, divided**
- **½ teaspoon ground pepper, divided**
- **2 tablespoons extra-virgin olive oil, divided**
- **6 cups green beans (about 1 pound), trimmed**
- **4 cloves garlic, thinly sliced**
- **1 teaspoon grated lemon zest**
- **1 teaspoon chopped fresh thyme, plus leaves for garnish**
- **¼ cup unsalted chicken broth**
- **¼ cup dry white wine**
- **1 tablespoon lemon juice**
- **¼ cup toasted pine nuts**
- **Lemon wedges for garnish**

1. Sprinkle chicken with ½ teaspoon salt and ¼ teaspoon pepper. Heat 1 tablespoon oil in a large skillet over medium-high heat. Cook the chicken, turning once, until an instant-read thermometer inserted in the thickest part registers 165°F, 3 to 4 minutes per side. Transfer to a plate.

2. Add the remaining 1 tablespoon oil and green beans to the pan. Sprinkle with the remaining ½ teaspoon salt and ¼ teaspoon pepper and cook, stirring occasionally, until tender-crisp, about 2 minutes. Stir in garlic, lemon zest and thyme; cook, stirring, until fragrant, about 1 minute. Add broth, wine and lemon juice and return the chicken and any accumulated juices to the pan. Cook, stirring occasionally, until the liquid is reduced by half, about 1 minute more.

3. Serve topped with pine nuts, more thyme and lemon wedges, if desired.

SERVES 4: 3 oz. chicken & 1 cup beans each
CAL 296 / **FAT** 16G (SAT 2G) / **CHOL** 63MG / **CARBS** 11G **TOTAL SUGARS** 4G (ADDED 0G) / **PROTEIN** 27G **FIBER** 4G / **SODIUM** 652MG / **POTASSIUM** 519MG.

GO NUTS

Pine nuts add buttery texture and a little crunch to this simple chicken dish. Got extra? Toss them onto soups or salads or refrigerate airtight for 1 month or freeze for 6 months.

BRIE PASSANO; STYLING: KELSEY BULAT (FOOD), SUE MITCHELL (PROPS); RECIPE BY ADAM DOLGE

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PAN PERFECTION

A cast-iron pan is a must-have for any steak lover. It can handle high heat and hold it evenly—giving you a nice sear on steak.

Seared Steak with Crispy Herbs & Escarole

ACTIVE: 20 min **TOTAL:** 20 min

Cooking herbs in the pan with the steak releases their aroma, infusing it into the meat while creating a crispy garnish.

- **1 pound sirloin steak, about ½ inch thick**
- **½ teaspoon salt, divided**
- **½ teaspoon ground pepper, divided**
- **2 tablespoons grapeseed oil *or* canola oil**
- **4 cloves garlic, crushed**
- **5 sprigs fresh thyme**
- **3 sprigs fresh sage**
- **1 sprig fresh rosemary**
- **16 cups chopped escarole (about 1 pound)**

1. Sprinkle steak with ¼ teaspoon each salt and pepper. Heat a large cast-iron skillet over medium-high heat. Add the steak and cook until charred on one side, about 3 minutes. Turn the steak over and add oil, garlic, thyme, sage and rosemary. Cook, stirring the herbs occasionally, until an instant-read thermometer inserted in the thickest part of the steak reaches 125°F for medium-rare, 3 to 4 minutes. Transfer the steak to a plate and top with the garlic and herbs. Tent with foil.

2. Add escarole and the remaining ¼ teaspoon each salt and pepper to the pan. Cook, stirring often, until the escarole starts to wilt, about 2 minutes. Thinly slice the steak and serve with the escarole and crispy herbs.

SERVES 4: 3 oz. steak, ¾ cup escarole & 1½ tsp. herbs each

CAL 244 / **FAT** 12G (SAT 2G) / **CHOL** 59MG
CARBS 10G / **TOTAL SUGARS** 1G (ADDED 0G)
PROTEIN 26G / **FIBER** 8G / **SODIUM** 394MG
POTASSIUM 1,111MG.

BRIE PASSANO; STYLING KELSEY BULAT (FOOD), SUE MITCHELL (PROPS); RECIPE BY ADAM DOLGE

Planet Pizza

AMERICANS AND ITALIANS AREN'T THE ONLY ONES OBSESSED WITH FANCY FLATBREADS. LEARN ABOUT THREE VARIETIES (BELOW) FROM ALL AROUND THE WORLD. BY JOY HOWARD

Turkish *Pide* An oval-shaped pie with toppings like cheese, herbs, eggs, ground beef and spicy sausage. (Say it like this: PEE-dae.)

Lebanese *Mana'eesh* A small round bread usually sprinkled with za'atar and sometimes studded with ground meat or cheese.

French *Pissaladiére* A rectangular flatbread typically garnished with onions, anchovies and oil-cured black olives.

Sausage & Kale Skillet Pizza

ACTIVE: 25 min **TOTAL:** 45 min

A piping-hot cast-iron skillet turns pizza dough into a puffy, crisp-bottomed crust (similar to focaccia). While you cook the sausage, have the kids tear up the kale—no knife required!

- **3 teaspoons extra-virgin olive oil, divided**
- **6 ounces (about 2 links) sweet Italian sausage, casings removed**
- **2 cups kale, torn into bite-size pieces**
- **1 pound whole-wheat pizza dough, at room temperature**
- **1 teaspoon cornmeal**
- **6 tablespoons drained fire-roasted diced tomatoes**
- **1 cup part-skim shredded mozzarella**

1. Place a 12-inch cast-iron skillet in the oven; preheat to 500°F.

2. Heat 1 teaspoon oil in a small skillet over medium-high heat. Add sausage and cook, stirring occasionally and breaking up with a wooden spoon, until no longer pink, 3 to 5 minutes.

KIDS DO **3.** Toss kale in a medium bowl with 1 teaspoon oil. Stretch dough into a 12-inch circle.

4. Remove the pan from the oven and sprinkle cornmeal into it. Carefully place the dough in the pan. Spread tomatoes over the dough, leaving a 1-inch border. Top with half the cheese, half the sausage and half the kale. Repeat with the remaining cheese, sausage and kale. Brush the edge of the dough with the remaining 1 teaspoon oil.

5. Bake until the bottom of the pizza is crisp and the cheese is starting to brown, about 15 minutes. Let cool for 5 minutes before serving.

SERVES 4: ¼ pizza each

CAL 429 / **FAT** 19G (SAT 5G) / **CHOL** 31MG / **CARBS** 49G **TOTAL SUGARS** 3G (ADDED 0G) / **PROTEIN** 22G **FIBER** 3G / **SODIUM** 787MG / **POTASSIUM** 177MG.

BRIE PASSANO; STYLING: KELSEY BULAT (FOOD), SUE MITCHELL (PROPS)

PANTRY PARTY

Whether you fry them as we do here, boil and toss with sauce or roast on a sheet pan—a box of shelf-stable gnocchi is a tasty weeknight dinner staple to keep on hand. Opt for whole-wheat to get 2 extra grams of fiber per serving compared to white.

Crispy Gnocchi with Tomatoes & Leeks

ACTIVE: 20 min **TOTAL:** 20 min

These gnocchi are crispy on the outside, tender on the inside because you sauté them in hot oil. Plus, they leave a little fond (crispy brown bits) in the pan that adds toasty flavor to the sauce.

- **3 tablespoons extra-virgin olive oil, divided**
- **1 pound gnocchi, preferably whole-wheat**
- **2 cups sliced leek (about 1 large)**
- **1 pint cherry tomatoes, halved**
- **1 tablespoon chopped fresh sage, plus more for garnish**
- **1 large clove garlic, minced**
- **¼ cup dry white wine**
- **2 tablespoons butter**
- **¼ cup grated Parmesan cheese**
- **¼ teaspoon ground pepper**

1. Heat 2 tablespoons oil in a large skillet over medium-high heat. Add gnocchi and cook, stirring occasionally, until crispy, 5 to 7 minutes. Transfer to a plate.

2. Add the remaining 1 tablespoon oil and leek to the pan. Cook, stirring frequently, until tender-crisp, about 2 minutes. Add tomatoes and cook until starting to soften, about 2 minutes. Add sage and garlic; cook, stirring, until fragrant, about 1 minute. Add wine and butter and cook until the butter melts, about 1 minute. Return the gnocchi to the pan and cook, stirring occasionally, until hot, 1 to 2 minutes more.

3. Serve the gnocchi and vegetables topped with Parmesan, pepper and more sage, if desired.

SERVES 4: 1 cup each

CAL 399 / **FAT** 19G (SAT 6G) / **CHOL** 20MG / **CARBS** 48G **TOTAL SUGARS** 5G (ADDED 0G) / **PROTEIN** 9G **FIBER** 6G / **SODIUM** 501MG / **POTASSIUM** 455MG.

RIFF IT!

Pump Up Protein
After Step 1, add 1 Tbsp. oil to the pan and cook 1 lb. peeled and deveined raw shrimp until pink, about 2 minutes. Transfer to the plate with the gnocchi and continue with Step 2.

Swap Sauces
Use ¼ cup pesto instead of butter in Step 2.

Nix the Gnocchi
Swap 1 lb. pork chops for the gnocchi in Step 1. Season with ¼ tsp. each salt and pepper and cook, turning once, until cooked through, about 5 minutes total. Continue with Step 2 and serve the pork topped with the vegetables.

BRIE PASSANO; STYLING: KELSEY BULAT (FOOD), SUE MITCHELL (PROPS); ILLUSTRATION: EMMA DIBBEN; RECIPE BY ADAM DOLGE

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- are scheduled to receive any vaccinations. You should not receive a "live vaccine" if you are treated with DUPIXENT
- are pregnant or plan to become pregnant. It is not known whether DUPIXENT will harm your unborn baby.
- are breastfeeding or plan to breastfeed. It is not known whether DUPIXENT passes into your breast milk.

Tell your healthcare provider about all the medicines you take, including prescription and over-the-counter medicines, vitamins and herbal supplements. If you are taking asthma medicines, do not change or stop your asthma medicine without talking to your healthcare provider.

DUPIXENT can cause serious side effects, including:

- **Allergic reactions (hypersensitivity), including a severe reaction known as anaphylaxis.** Stop using DUPIXENT and tell your healthcare provider or get emergency help right away if you get any of the following symptoms: breathing problems, fever, general ill feeling, swollen lymph nodes, swelling of the face, mouth and tongue, hives, itching, fainting, dizziness, feeling lightheaded (low blood pressure), joint pain, or skin rash.
- **Eye problems.** Tell your healthcare provider if you have any new or worsening eye problems, including eye pain or changes in vision.

The most common side effects include injection site reaction, eye and eyelid inflammation, including redness, swelling and itching, pain in the throat (oropharyngeal pain) and cold sores in your mouth or on your lips.

Tell your healthcare provider if you have any side effect that bothers you or that does not go away. These are not all the possible side effects of DUPIXENT. Call your doctor for medical advice about side effects. You are encouraged to report negative side effects of prescription drugs to the FDA. Visit www.fda gov/medwatch, or call 1-800-FDA-1088.

Use DUPIXENT exactly as prescribed. DUPIXENT is given as an injection under the skin (subcutaneous injection). If your healthcare provider decides that you or a caregiver can give DUPIXENT injections, you or your caregiver should receive training on the right way to prepare and inject DUPIXENT. **Do not** try to inject DUPIXENT until you have been shown the right way by your healthcare provider. In adolescents 12 years of age and older, it is recommended that DUPIXENT be administered by or under supervision of an adult.

Please see accompanying Brief Summary on next page.

SANOFI GENZYME REGENERON

You may be eligible for a $0 copay† for DUPIXENT.
†Limitations apply. Visit DUPIXENT.com for full program terms.

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Brief Summary of Important Patient Information about DUPIXENT® (dupilumab) Rx Only
(DU-pix'-ent)
injection, for subcutaneous use

What is DUPIXENT?
- DUPIXENT is a prescription medicine used:
  - to treat people aged 12 years and older with moderate-to-severe atopic dermatitis (eczema) that is not well controlled with prescription therapies used on the skin (topical), or who cannot use topical therapies. DUPIXENT can be used with or without topical corticosteroids.
  - with other asthma medicines for the **maintenance treatment of moderate-to-severe asthma** in people aged 12 years and older whose asthma is not controlled with their current asthma medicines. DUPIXENT helps prevent severe asthma attacks (exacerbations) and can improve your breathing. DUPIXENT may also help reduce the amount of oral corticosteroids you need while preventing severe asthma attacks and improving your breathing.
- DUPIXENT works by blocking two proteins that contribute to a type of inflammation that plays a major role in atopic dermatitis and asthma.
- DUPIXENT is not used to treat sudden breathing problems
- It is not known if DUPIXENT is safe and effective in children with atopic dermatitis under 12 years of age.
- It is not known if DUPIXENT is safe and effective in children with asthma under 12 years of age.

Who should not use DUPIXENT?
Do not use DUPIXENT if you are allergic to dupilumab or to any of the ingredients in DUPIXENT. See the end of this summary of information for a complete list of ingredients in DUPIXENT.

What should I tell my healthcare provider before using DUPIXENT?
Before using DUPIXENT, tell your healthcare provider about all your medical conditions, including if you:
- have eye problems (if you also have atopic dermatitis)
- have a parasitic (helminth) infection
- are taking oral, topical, or inhaled corticosteroid medicines. **Do not** stop taking your corticosteroid medicines unless instructed by your healthcare provider. This may cause other symptoms that were controlled by the corticosteroid medicine to come back.
- are scheduled to receive any vaccinations. You should not receive a "live vaccine" if you are treated with DUPIXENT.
- are pregnant or plan to become pregnant. It is not known whether DUPIXENT will harm your unborn baby.

  Pregnancy Registry. There is a pregnancy registry for women who take DUPIXENT during pregnancy. The purpose of this registry is to collect information about your health and your baby's health. You can talk to your healthcare provider or contact 1-877-311-8972 or go to https://mothertobaby.org/ongoing-study/dupixent/ to enroll in this registry or get more information.

- are breastfeeding or plan to breastfeed. It is not known whether DUPIXENT passes into your breast milk.

Tell your healthcare provider about all of the medicines you take including prescription and over-the-counter medicines, vitamins, and herbal supplements. If you have asthma and are taking asthma medicines, do not change or stop your asthma medicine without talking to your healthcare provider.

How should I use DUPIXENT?
- **See the detailed "Instructions for Use" that comes with DUPIXENT for information on how to prepare and inject DUPIXENT and how to properly store and throw away (dispose of) used DUPIXENT pre-filled syringes.**
- Use DUPIXENT exactly as prescribed by your healthcare provider.
- DUPIXENT comes as a single dose pre-filled syringe with needle shield.
- DUPIXENT is given as an injection under the skin (subcutaneous injection).
- If your healthcare provider decides that you or a caregiver can give the injections of DUPIXENT, you or your caregiver should receive training on the right way to prepare and inject DUPIXENT. **Do not** try to inject DUPIXENT until you have been shown the right way by your healthcare provider. In adolescents 12 years of age and older, it is recommended that DUPIXENT be administered by or under supervision of an adult.
- If you miss a dose of DUPIXENT, give the injection within 7 days from the missed dose, then continue with the original schedule. If the missed dose is not given within 7 days, wait until the next scheduled dose to give your DUPIXENT injection.
- If you inject more DUPIXENT than prescribed, call your healthcare provider right away.
- Your healthcare provider may prescribe other medicines to use with DUPIXENT. Use the other prescribed medicines exactly as your healthcare provider tells you to.

Stop using DUPIXENT and tell your healthcare provider or get emergency help right away if you get any of the following symptoms: breathing problems, fever, general ill feeling, swollen lymph nodes, swelling of the face, mouth and tongue, hives, itching, fainting, dizziness, feeling lightheaded (low blood pressure), joint pain, or skin rash.

What are the possible side effects of DUPIXENT?
DUPIXENT can cause serious side effects, including:
- **Allergic reactions (hypersensitivity), including a severe reaction known as anaphylaxis.** Stop using DUPIXENT and tell your healthcare provider or get emergency help right away if you get any of the following symptoms: breathing problems, fever, general ill feeling, swollen lymph nodes, swelling of the face, mouth and tongue, hives, itching, fainting, dizziness, feeling lightheaded (low blood pressure), joint pain, or skin rash.
- **Eye problems.** If you have atopic dermatitis, tell your healthcare provider if you have any new or worsening eye problems, including eye pain or changes in vision.
- **Inflammation in your blood vessels:** Rarely, this can happen in people with asthma who receive DUPIXENT. This may happen in people who also take a steroid medicine by mouth that is being stopped or the dose is being lowered. It is not known whether this is caused by DUPIXENT. Tell your healthcare provider right away if you have: rash, shortness of breath, persistent fever, chest pain, or a feeling of pins and needles or numbness of your arms or legs.

The most common side effects of DUPIXENT include: injection site reactions, pain in the throat (oropharyngeal pain) and cold sores in your mouth or on your lips. Eye and eyelid inflammation, including redness, swelling and itching have been seen in patients who have atopic dermatitis. Tell your healthcare provider if you have any side effect that bothers you or that does not go away.
These are not all of the possible side effects of DUPIXENT. Call your doctor for medical advice about side effects. You may report side effects to FDA.
Visit www.fda.gov/medwatch, or call 1-800-FDA-1088.

General information about the safe and effective use of DUPIXENT.
Medicines are sometimes prescribed for purposes other than those listed in a Patient Information leaflet. Do not use DUPIXENT for a condition for which it was not prescribed. Do not give DUPIXENT to other people, even if they have the same symptoms that you have. It may harm them.
This is a summary of the most important information about DUPIXENT. If you would like more information, talk with your healthcare provider. You can ask your pharmacist or healthcare provider for more information about DUPIXENT that is written for healthcare professionals.
For more information about DUPIXENT, go to www.DUPIXENT.com or call 1-844-DUPIXENT (1-844-387-4936)

What are the ingredients in DUPIXENT?
Active ingredient: dupilumab
Inactive ingredients: L-arginine hydrochloride, L-histidine, polysorbate 80, sodium acetate, sucrose, and water for injection

Manufactured by: Regeneron Pharmaceuticals, Inc., Tarrytown, NY 10591
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Issue Date: March 2019

Piri Piri Chicken Thighs

ACTIVE: 40 min **TOTAL:** 1 hr

TO MAKE AHEAD: Refrigerate sauce (Steps 1-5) for up to 1 week or freeze for up to 3 months. Refrigerate chicken for up to 3 days.

Piri piri is a popular Portuguese sauce made with African bird's eye chiles. Here we blend the hot peppers with sweet bell peppers, vinegar and spices to season chicken.

- **2 large red bell peppers, halved**
- **1 medium red onion, halved**
- **6 cloves garlic**
- **½ cup extra-virgin olive oil**
- **8 dried bird's eye chiles *or* serrano chiles, stemmed and seeded, if desired**
- **1 tablespoon grated lemon zest**
- **½ cup lemon juice**
- **¼ cup red-wine vinegar**
- **2 teaspoons kosher salt, divided**
- **1 ½ teaspoons dried oregano**
- **1 ½ teaspoons smoked paprika**
- **1 teaspoon ground pepper**
- **2 bay leaves**
- **6 pounds bone-in, skin-on chicken thighs, trimmed**
- **Charred lemon for garnish**

1. Position racks in middle and upper thirds of oven. Preheat broiler to high. Spray a large rimmed baking sheet with cooking spray.

2. Place bell peppers, onion and garlic on the prepared pan. Broil on the top rack, turning often, until charred on all sides, about 8 minutes. Set aside. Reduce oven temperature to 425°F.

3. Meanwhile, heat oil and chiles in a medium saucepan over medium heat. Cook, stirring occasionally, until the chiles start to darken in color, about 3 minutes. Remove from heat and let cool for 5 minutes.

4. Coarsely chop the bell peppers and onion and peel the garlic; transfer to a blender. Add the chiles and oil, lemon zest, lemon juice, vinegar, 1 teaspoon salt, oregano, paprika and ground pepper; puree until smooth.

5. Return the sauce to the pan and add bay leaves. Bring to a simmer over medium heat and cook, stirring occasionally, for 10 minutes.

6. Pat chicken dry with paper towels. Place on the baking sheet, skin-side up, sprinkle both sides with the remaining 1 teaspoon salt and generously brush with ½ cup of the sauce.

7. Bake on the upper rack until an instant-read thermometer inserted in the thickest part of a thigh without touching bone registers 165°F, about 30 minutes. Turn the broiler to high and continue cooking until starting to brown, about 2 minutes.

8. Brush each thigh with another 1 tablespoon of the sauce. Serve with additional sauce and charred lemons, if desired.

SERVES 16: 3 oz. chicken each

CAL 210 / **FAT** 12G (SAT 3G) / **CHOL** 69MG / **CARBS** 4G **TOTAL SUGARS** 1G (ADDED 0G) / **PROTEIN** 20G **FIBER** 2G / **SODIUM** 205MG / **POTASSIUM** 302MG.

Meal-Prep Magic

WE DESIGNED THIS RECIPE TO MAKE MORE THAN YOU NEED FOR ONE DINNER. HERE ARE 3 WAYS TO USE THE REST OF THE CHICKEN AND SAUCE THROUGHOUT THE WEEK.

BUILD-A-BOWL

Top cooked whole grains with your favorite veggies, shredded leftover chicken and a drizzle of the sauce.

SAUCE UP SALAD

Whisk some of the sauce with oil and vinegar to make a vinaigrette to toss with leafy greens. Top with chicken.

TURN OUT TACOS

Serve the chicken in warm corn tortillas with your favorite taco toppings.

BRIE PASSANO; STYLING: KELSEY BULAT (FOOD), SUE MITCHELL (PROPS); RECIPE BY BREANA KILLEEN

Muhammara

ACTIVE: 15 min **TOTAL:** 45 min
TO MAKE AHEAD: Refrigerate for up to 5 days.
Muhammara is a smoky, hot and sweet red pepper dip that originated in Syria. A staple in Middle Eastern cooking, pomegranate molasses (a dark red syrup made from tart pomegranate juice) adds just the right amount of sweetness and acidity to this recipe.

- **3 large red bell peppers**
- **½ cup fresh whole-wheat breadcrumbs**
- **7 tablespoons toasted walnuts**
- **2 tablespoons extra-virgin olive oil**
- **2 tablespoons lemon juice**
- **1 tablespoon pomegranate molasses**
- **3 cloves garlic**
- **1 teaspoon ground Aleppo pepper *or* crushed red pepper, or to taste**
- **¼ teaspoon salt**

1. Preheat grill or broiler to high.
2. Grill or broil peppers, turning occasionally, until blackened in spots, 15 to 20 minutes total. (If using the broiler, place a rack on a baking sheet and place the peppers on the rack.) Transfer to a large bowl and cover tightly. Let steam for 10 minutes. Uncover and let cool. Remove stems, skins and seeds.
3. Transfer the peppers to a food processor. Add breadcrumbs, walnuts, oil, lemon juice, pomegranate molasses, garlic, Aleppo (or crushed red pepper) and salt. Pulse until slightly chunky.
SERVES 8: ¼ cup each
CAL 129 / **FAT** 9G (SAT 1G) / **CHOL** 0MG
CARBS 10G / **TOTAL SUGARS** 4G (ADDED 0G)
PROTEIN 3G / **FIBER** 2G / **SODIUM** 126MG
POTASSIUM 218MG.

Turn this simple dip into a full-blown appetizer spread (or dinner, we won't judge!) with the addition of some crudités, grilled eggplant and crackers for scooping. Pair it with a bubbly cava, like the **2017 Naveran Brut Cava, Spain ($20),** for an instant party.

JENNIFER CAUSEY; STYLING: MARGARET DICKEY (FOOD), SARAH ELIZABETH CLEVELAND (PROPS); RECIPE BY CAROLYN MALCOUN

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Hot Potatoes

Whether you make it a DIY buffet or top them all before serving, loaded spuds are an easy and fun dinner. Mix and match your favorite toppings or choose one of our combos pictured here.

BARBECUE SAUCE
+
BROCCOLI
+
SHREDDED PORK
+
CHEDDAR CHEESE

MADRAS CURRY SIMMER SAUCE
+
CAULIFLOWER
+
CHICKEN
+
CILANTRO

SOUR CREAM
+
TOMATO & RED ONION
+
SMOKED SALMON
+
CHIVES

1. BAKE. Start with 4 medium **russet potatoes** *or* **sweet potatoes** (about 8 oz. each). Pierce them all over with a fork. Microwave on Medium, turning once or twice, until soft, about 20 minutes. *(Alternatively, bake at 425°F until tender, about 45 minutes.)* Transfer to a cutting board and let cool slightly. Holding it with a kitchen towel to protect your hands, make a lengthwise cut to open each potato or sweet potato, but don't cut all the way through. Pinch the ends to expose the flesh.

2. STUFF. Top each potato with a **Sauce**, **Vegetables**, **Protein** and **Garnish.**

Nutrition info on page 114.

→ **FULL RECIPES** *with nutrition info at eatingwell.com/potatoformula*

Get picky eaters to dive into this healthy burger-inspired potato *(below)* with a dollop of Heinz Simply Tomato Ketchup. (No artificial sweeteners!)

Scan here to see this recipe come together

SAUCE (½ cup total)

- Pesto
- Fresh salsa
- Barbecue sauce
- Simmer sauce
- Sour cream
- Mayonnaise
- Marinara sauce
- Hummus
- Cheese sauce

VEGETABLES (1-2 cups total)

- Cooked greens
- Sautéed mushrooms
- Avocado
- Onion
- Cooked broccoli *or* cauliflower
- Diced tomatoes
- Shredded lettuce

PROTEIN

- 4 large eggs, cooked as desired
- One 15-ounce can beans, rinsed
- 8 ounces cooked pork, chicken *or* ground beef
- 4 ounces smoked *or* pickled fish

GARNISH (4 tsp. total)

- Crumbled cooked bacon
- Chopped pickled jalapeños
- Shredded cheese
- Chopped fresh herbs
- Chopped olives
- Dried spices

LEIGH BEISCH; STYLING: EMILY CANEER (FOOD), GLENN JENKINS (PROPS); REC.PES: DEVON O'BRIEN, BREANA K LLEEN

Salt & Vinegar Chicken & Brussels Sprouts

ACTIVE: 20 min **TOTAL:** 45 min

A strong vinegar, like malt or sherry, gives this dish a pucker factor reminiscent of salt-and-vinegar chips.

- **1½ pounds bone-in, skin-on chicken breasts**
- **3 tablespoons extra-virgin olive oil, divided**
- **1 teaspoon kosher salt, divided**
- **½ teaspoon ground pepper, divided**
- **1½ pounds Brussels sprouts, trimmed and halved *or* quartered if large**
- **2 medium red onions, cut into ½-inch wedges**
- **6 tablespoons malt *or* sherry vinegar**
- **½ teaspoon dried dill**
- **½ teaspoon garlic powder**
- **½ teaspoon onion powder**
- **¼ teaspoon sugar**

1. Preheat oven to 450°F.

2. Cut chicken breasts into 4 equal portions. Brush with 1 tablespoon oil and sprinkle with ¼ teaspoon each salt and pepper. Toss Brussels sprouts and onions in a large bowl with the remaining 2 tablespoons oil and ¼ teaspoon each salt and pepper. Arrange the vegetables and the chicken in a single layer on a rimmed baking sheet.

3. Roast until an instant-read thermometer inserted in the thickest part of a breast without touching bone registers 160°F and the vegetables are tender, 20 to 25 minutes.

4. Meanwhile, mix vinegar, dill, garlic powder, onion powder, sugar and the remaining ½ teaspoon salt in a small microwave-safe bowl. Microwave on High until the salt and sugar dissolve, about 30 seconds.

5. Drizzle the vinegar mixture over the chicken and vegetables and roast for 5 minutes more. Transfer the chicken to a serving platter and stir the vegetables on the pan. Serve the vegetables with the chicken.

SERVES 4: 3 oz. chicken & 1¼ cups vegetables each

CAL 387 / **FAT** 19G (SAT 4G) / **CHOL** 83MG
CARBS 20G / **TOTAL SUGARS** 6G (ADDED 0.3G)
PROTEIN 35G / **FIBER** 7G / **SODIUM** 592MG
POTASSIUM 934MG.

Hold your phone's camera over this smart code to get a month of one-pan dinners.

LEIGH BEISCH; STYLING: EMILY CANEER (FOOD), GLENN JENKINS (PROPS); RECIPE BY BREANNA KILLEEN

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Chile-Garlic Roasted Kohlrabi

ACTIVE: 20 min **TOTAL:** 40 min
Preheat oven to 450°F. Peel 1½ pounds **kohlrabi** and cut into ½-inch wedges. Combine 2 Tbsp. **extra-virgin olive oil,** 1 tsp. each grated **garlic** and minced **serrano pepper** and ¼ tsp. each **salt** and **ground pepper** in a large bowl. Add the kohlrabi and toss to coat. Transfer to a rimmed baking sheet. Roast, stirring once halfway, until tender and browned, 20 to 25 minutes. Sprinkle with 2 Tbsp. fresh **cilantro.**
SERVES 6: ½ cup each
CAL 76 / **FAT** 5G (SAT 1G) / **CHOL** 0MG / **CARBS** 7G
TOTAL SUGARS 3G (ADDED 0G) / **PROTEIN** 2G
FIBER 4G / **SODIUM** 120MG / **POTASSIUM** 401MG.

Kohlrabi, Fennel & Apple Slaw

ACTIVE: 20 min **TOTAL:** 20 min
TO MAKE AHEAD: Refrigerate for up to 1 day.
Chop enough fronds from 1 medium **fennel** bulb to equal ¼ cup. Thinly slice the bulb. Cut 1 peeled medium **kohlrabi** and 1 small **apple** into matchsticks. Whisk ¼ cup **extra-virgin olive oil,** 2 Tbsp. **cider vinegar,** 2 tsp. each **whole-grain mustard** and minced **shallot,** 1 tsp. **honey,** ½ tsp. **salt** and ¼ tsp. **ground pepper** in a large bowl. Add the fennel and fronds, kohlrabi and apple; gently stir to coat.
SERVES 5: 1 cup each
CAL 149 / **FAT** 12G (SAT 2G) / **CHOL** 0MG / **CARBS** 11G
TOTAL SUGARS 7G (ADDED 1G) / **PROTEIN** 1G
FIBER 3G / **SODIUM** 303MG / **POTASSIUM** 328MG.

Kohlrabi Gratin

ACTIVE: 30 min **TOTAL:** 1 hr
Preheat oven to 400°F. Coat an 8-inch-square baking dish with cooking spray. Peel 3 pounds **kohlrabi** (6-7 medium) and cut into ⅛-inch slices. Cook in a large pot of boiling water until tender, about 10 minutes. Drain. Meanwhile, melt 1 Tbsp. **butter** in a small skillet over medium heat. Add 1 large sliced **leek** and cook until softened, about 5 minutes. Heat 1 cup low-fat **milk** in a small saucepan over medium heat until steaming. Whisk 3 Tbsp. all-purpose **flour** and ⅓ cup **milk** in a small bowl until smooth; stir into the hot milk and cook, whisking constantly, until thickened, 2 to 3 minutes. Remove from heat; stir in ½ tsp. **salt,** ¼ tsp. **ground pepper** and a pinch of **nutmeg.** Layer ⅓ of the kohlrabi, leek, sauce and ⅓ cup shredded **Gruyère cheese**; repeat for 2 more layers. Sprinkle with ⅓ cup **whole-wheat breadcrumbs.** Bake until bubbling and golden, 25 to 30 minutes. Let cool for 5 minutes before serving.
SERVES 8: ½ cup each
CAL 163 / **FAT** 7G (SAT 4G) / **CHOL** 21MG / **CARBS** 19G
TOTAL SUGARS 7G (ADDED 0G) / **PROTEIN** 9G
FIBER 7G / **SODIUM** 300MG / **POTASSIUM** 692MG.

BRIE PASSANO; STYLING: KELSEY BULAT (FOOD), SUE MITCHELL (PROPS); RECIPES BY BREANA KILLEEN, ADAM DOLGE

→ **Find even more ways to use this root at *eatingwell.com/kohlrabirecipes***

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Almond & Pear Rose Tarts

ACTIVE: 35 min **TOTAL:** 1 hr 5 min
TO MAKE AHEAD: Refrigerate for up to 1 day. Reheat slightly before serving.
EQUIPMENT: Muffin tin with 12 (½-cup) cups
Thinly slicing the pears lets you roll up the tarts more neatly, giving you a bakery-worthy presentation. If you have a mandoline, this is a good time to pull it out. Cold puff pastry is important to ensure you get irresistibly flaky results.

- **2 teaspoons sugar**
- **¼ teaspoon ground cardamom**
- **¼ teaspoon ground cinnamon**
- **Pinch of salt**
- **4 cups very thinly sliced red pears (2 medium)**
- **All-purpose flour for dusting and rolling**
- **1 sheet frozen puff pastry, thawed in the refrigerator**
- **3 tablespoons almond paste**

1. Preheat oven to 400°F. Lightly coat a 12-cup muffin tin with cooking spray.
2. Combine sugar, cardamom, cinnamon and salt in a large bowl. Add pears and toss to coat.
3. Dust a clean work surface with flour. Unfold the thawed, cold puff pastry and roll it out to a 10-inch square. Cut into 1-inch strips. Dust the surface again; roll almond paste into a 5-by-8-inch rectangle. Cut into 10 strips, ½ inch by 8 inches.
4. Top each pastry strip with an almond strip and layer on pears lengthwise, leaving a 1-inch gap at each end. Starting at a short edge, gently tuck the overhanging pastry around the cut side of the pears and tightly roll up the pastry into a coil. Place in the prepared muffin tin. Place the tin in the freezer for 5 minutes.
5. Bake the tarts until golden brown, 20 to 25 minutes. Let cool for 5 minutes before serving.
SERVES 10: 1 each
CAL 186 / **FAT** 11G (SAT 1G) / **CHOL** 0MG / **CARBS** 20G / **TOTAL SUGARS** 7G (ADDED 2G) / **PROTEIN** 3G / **FIBER** 2G / **SODIUM** 77MG / **POTASSIUM** 57MG.

GRAIN CHANGER

Want to make this easy dessert gluten-free? Just swap in gluten-free puff pastry, found in the freezer section of most grocery stores. And don't forget to use an all-purpose gluten-free flour blend to roll it out!

BRIE PASSANO; STYLING: KELSEY BULAT (FOOD), SUE MITCHELL (PROPS); ILLUSTRATION: EMMA DIBBEN; RECIPE BY ADAM DOLGE

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Halfway to Dinner

Surprise! Frozen burgers can be more than just, well, burgers. Turn the page for these lettuce wraps and more ways to turn supermarket shortcuts into satisfaction. **By Joyce Hendley**

MAREN CARUSO, STYLING: ALICIA DEAL (FOOD), PRODUCER: JENNIFER THOMAS PRODUCTIONS

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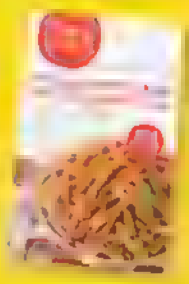
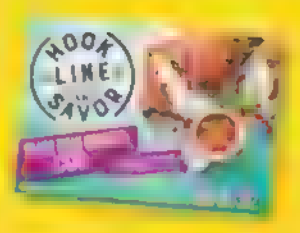
WHAT TO BUY	WHY WE LOVE IT	WHAT TO DO WITH IT
Teton Waters Ranch Burger Blends—Mushroom & Onion	Vegetables are blended with grass-fed, antibiotic- and hormone-free beef in these burgers to add flavor and nutrition while decreasing their carbon footprint. ***180 cal / 13 g protein / 0 g fiber per serving***	**Lettuce Wraps *(p.57)*:** Crumble thawed burgers into a skillet and cook until no longer pink; stir in a handful of shredded carrots and chopped scallions with some peanut or hoisin sauce. Sprinkle with chopped cilantro and spoon into lettuce leaves.
Modern Table Complete Protein Pasta—Sundried Tomato-Basil Penne 	This dry pasta kit comes complete with a sauce packet and sun-dried tomatoes. The protein-rich red lentil noodles cook up tender in a flash and just happen to be gluten-free. ***320 cal / 17 g protein / 5 g fiber per serving***	**One-Pan Pasta Primavera:** Cook pasta according to package directions, adding in some frozen veggies in the last 2 minutes of cooking; drain. Stir in a can of rinsed white beans with some olive oil and the seasoning packet. Cook, stirring, until hot.
Hook Line & Savor Black Bean Crusted Cod with Roasted Corn & Red Pepper Salsa 	No frying needed for a wonderfully crisp fillet. The coating is protein- and fiber-rich, boosted with black beans and peas plus a flavorful touch of garlic, lime and jalapeño. ***170 cal / 15 g protein / 4 g fiber per serving***	**Super-Fast Fish Tacos:** Bake fillets according to package directions. Cut into bite-size chunks and layer in warmed corn tortillas with coleslaw mix, chopped onions and avocado, and top with the included salsa.
Tasty Bite Channa Masala	Open a shelf-stable, 2-serving pouch, and you've got a perfectly seasoned, plant-protein-powered curry that's even better with some extra cooked vegetables stirred in. ***170 cal / 6 g protein / 5 g fiber per serving***	**Indian-Inspired Pasta Salad:** Toss the heated channa masala with cooked pasta and cauliflower or broccoli florets; sprinkle with chopped cilantro and shredded coconut.
Trader Joe's Multigrain Blend with Vegetables	Think of this quick-cooking frozen melange of three kinds of rice, whole grains and tons of veggies as "rice with benefits." ***180 cal / 5 g protein 5 g fiber per serving***	**Quick Grain Salad:** Thaw the grain mixture and stir in some chopped rotisserie chicken, baby spinach or kale, sliced apples and a handful of chopped herbs. Drizzle with oil and vinegar and toss.

OLIVER PARINI

Raise the Bar

Looking for a protein fix? Use these tips so you don't end up with candy We tried more than 100 bars to find out which deliver on taste *and* nutrition

PRO TIP
Aim for at least 10 grams of protein (that's more than an egg!) to satisfy hunger longer and, post-workout, help muscles rebuild and recover.

DECODE CALORIES
There's a wide range among bars—from 100 to 400 calories or more. For snacking, stick with bars that have 200 or less, but if you're replacing a meal, going up to 350 calories makes sense.

SLEUTH SUGARS
With flavors like chocolate chip cookie dough and salted caramel, many protein bars straddle dessert territory. Most only list total sugar, so check the ingredient list for added sweeteners like sugar and honey (ones like dates are fine). If you see them, opt for a bar with less than 18 grams. No added sweeteners? Don't sweat it.

Hover your phone's camera over this code to find 10 satisfying snacks that have more protein than an egg.

NUMBERS TO LOOK FOR

Calories: 200 or less for a snack; 350 or less for a mini meal
Total sugar: 18g or less
Protein: ≥ 10g
Fiber: ≥ 3g

Brands We Love

Epic Performance Bar Peanut Butter Dates, nuts and egg whites combine for satisfying chew. ***12 g protein***

Lärabar Protein Lemon Blueberry Muffin Lärabar's new bars have double the protein of the original and mimic flavors of favorite treats, like muffins. ***11 g protein***

RXBar Peanut Butter & Berries Sweetened with dates (hello, fiber), this bar has no added sugar and tastes like a PB&J. ***12 g protein***

PowerBar ProteinPlus Chocolate Peanut Butter This classic flavor combo tastes like candy, without the sugar crash. ***20 g protein***

Clif Whey Protein Bar Coconut Almond Chocolate One of Clif's lowest-sugar options still has all the chocolaty, nutty goodness we love. ***14 g protein***

MAREN CARUSO; STYLING: ALICIA DEAL (FOOD); PRODUCER: JENNIFER THOMAS PRODUCTIONS

Breakfast in Hand

Alarm didn't go off? No eggs in the fridge? No matter the holdup, a fast-food breakfast sandwich can be oh-so-tasty and convenient. Our favorite menu picks offer a good jump-start, with plenty of protein, a little fiber—and vegetables whenever we can find them.

Taco Bell Breakfast Soft Taco "Fresco" Style (with extra egg, no bacon, plus guacamole)
240 cal / 9 g protein / 2 g fiber / 510 g sodium
These simple customizations help trim the sodium and saturated fat and add extra protein for a taco with staying power. A healthy dollop of fresh guac and pico de gallo make it mouthwatering.

Starbucks Reduced-Fat Turkey Bacon & Egg White Breakfast Sandwich
230 cal / 18 g protein 3 g fiber / 550 mg sodium
Why don't more fast-food sandwiches come on whole-wheat English muffins like this one? Starbucks takes it up a notch with flavorful sharp Cheddar and a little smoke from turkey bacon.

Panera Avocado, Egg White & Spinach Breakfast Sandwich
410 cal / 21 g protein 7 g fiber / 590 mg sodium
Between the spinach, slices of avocado, tomato and Vermont Cheddar, there's plenty of flavor, color and filling ingredients tucked into this sprouted-grain "bagel flat."

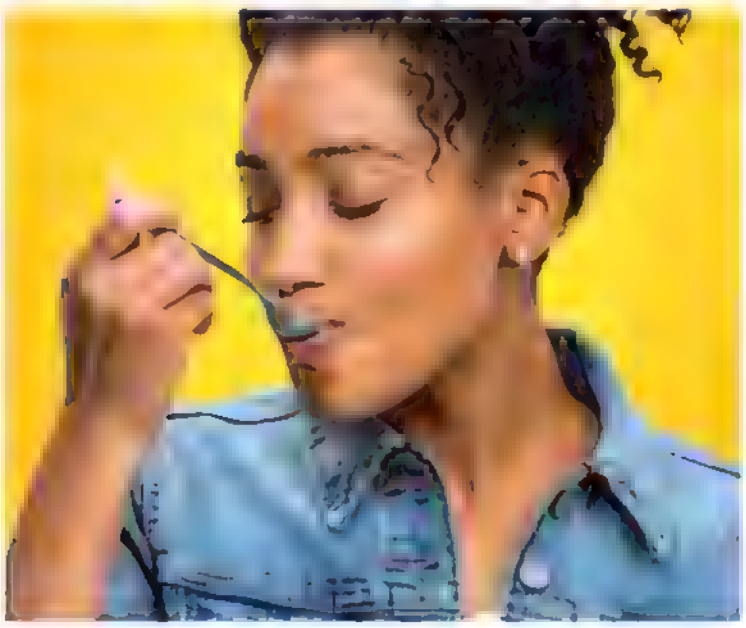
Subway Egg & Cheese 6-inch Breakfast Sandwich, (hold the cheese, with tomatoes, cucumbers and onions)
350 cal / 18 g protein 5 g fiber / 740 mg sodium
We love how Subway lets us build-our-own: Here, we pile on the (free) vegetables for a tasty, crunchtastic sandwich.

White Castle Breakfast Toast Sandwich with Egg & Jalapeño Cheese
280 cal / 11 g protein 2 g fiber / 560 mg sodium
Sure, the Castle's known for sliders, and there are breakfast versions, but it's too easy to eat 'em by the handful. We favor this full-size sandwich, with egg, a little bacon and a kick of heat.

Au Bon Pain Egg Whites, Cheddar & Avocado on a Skinny Wheat Bagel
360 cal / 19 g protein 9 g fiber / 590 mg sodium
A sandwich on a bagel flat, aka flagel? Yes please. This one is full of nutty whole grains and piles on the avocado and cheese.

Einstein Brothers Avocado Toast (with 1 egg on a Thintastic Whole-Wheat Bagel)
400 cal / 17 g protein 8 g fiber / 760 mg sodium
Avocado toast, meet bagel egg sandwich. A sprinkle of everything bagel spice makes this pick extra tempting.

MAREN CARUSO, STYLING ALICIA DEAL (FOOD), PRODUCER JENNIFER THOMAS PRODUCTIONS



TASTY BITE

ONE BITE WILL CHANGE EVERYTHING

We pack the bold flavors of all natural Indian food into a pouch that's ready to devour in 60 seconds.

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FUTURE *of* FOOD

MAREN CARUSO; STYLING: ALICIA DEAL

Why devote an entire issue to this topic? Because America's food system is changing rapidly in just about every area you can imagine. As the following stories show, the very real challenges we face are being met with optimism and innovation. Scientists are using sophisticated gene-editing tools to make our food supply more nutritious, abundant and resilient when it comes to thriving on our ever-warming planet. As chronic conditions like heart disease and diabetes continue to rise, nutrition researchers are looking beyond vitamins from A to zinc and instead examining the ways our microbiomes and individual DNA could guide our food choices and health. Even day-to-day chores—like grocery shopping and cooking—are poised for improvements, thanks to technology soon to be found in your supermarket and kitchen. While we don't have a crystal ball, this special section offers a glimpse into our delicious future and explores bold predictions from top thought leaders about how our food will become healthier and more sustainable in the years to come.

Coming Soon to a Plate Near You

TRENDCASTING

EatingWell sat down with nine trend whisperers—from nutrition and agriculture experts to lab-grown-meat gurus and microbiome researchers—to find out what transformative technologies, policies and products will define the next decade of eating in America. Buckle up: The road ahead will take us through some wild territory, with a lot to look forward to. We'll let our pros explain in their own words. **Reported by Sophie Egan**

ILLUSTRATIONS BY RICHARD MIA

LAB-GROWN MEAT GOES MAINSTREAM

THE EXPERT

Brad Barbera, *director of innovation at the Good Food Institute, a nonprofit think tank headquartered in Washington, D.C., that focuses on transforming our current food system from industrial animal agriculture to one centered on plant-based alternatives and cell-based meat.*

We've seen an explosion of interest in the cell-based meat industry (also called cellular agriculture). This is meat that's grown in a controlled, clean production facility by "feeding" a small sample of animal cells the right nutrients so that they multiply and grow until you have enough to make an actual piece of meat. And I think we're at an inflection point now where we'll see the technology accelerate much faster than we have in the past five years. Some of the brands pursuing cellular ag now are Memphis Meats and Finless Foods. Products are not on the grocery store shelves yet, but within 10 years, we're looking at cellular beef, chicken and fish competing side-by-side with conventionally produced meat. In fact, I see cellular ag vastly outperforming traditional animal products because, as the technology improves, it can be designed to fit the consumer's needs. Imagine being able to select a blend of your favorite proteins—say, beef, pork and ostrich—combined in a single piece of meat with the exact texture and amount and type of fat you want (higher in omega-3s and lower in saturated fat, for example). You wouldn't be limited by an animal's biology or how it was raised.

Eventually, the technology will get to the point where consumers simply enjoy it for the superior taste and affordable price (which has already dropped from the initial project's cost of more than $1 million per pound in 2013 to maybe $25 to $50 currently). They won't think about the fact that it's cell-based meat—they'll eat it because they like it. Because it's the new normal. I love comparing it to the example of Louise Brown, the world's first test-tube baby. When she was born more than 40 years ago, many considered IVF (in vitro fertilization) "unnatural" and her parents got hate mail. But now there are more than 8 million people in the world—that's the entire population of New York City—who were born through IVF. It's perfectly normal and acceptable. That's how I imagine these meats being seen.

INSET: MATTHEW D'AGOSTINO FOR GFI

65% OF AMERICANS ARE WILLING TO TRY LAB-GROWN MEAT ACCORDING TO A 2019 POLL

SOURCE: FRONTIERS IN NUTRITION

MICROBIOME MONITORING FOR ALL

THE EXPERTS
Erica D. Sonnenburg, Ph.D., *and* **Justin L. Sonnenburg, Ph.D.,** *senior research scientist and principal investigator (respectively) at the Sonnenburg Lab at Stanford University in California, a leading research center on the microbiome. They are co-authors of* The Good Gut.

Justin: Scientists now have a really good understanding of the microbiome—the bacteria that populate your gut—in the context of laboratory animals. We know that it is at the center of health and is integrated into immune function, metabolism and the nervous system. The future is about answering how the microbiome influences these things in humans. We have some research, but it's still very new.

Erica: Once we understand the way diet impacts the human microbiome in general, then we can see how it applies to the individual. Everyone's microbiota is somewhat different, so in the next five to 10 years we'll see the more personalized aspects of this science—how each person can make food choices to specifically influence his or her own microbiome and help prevent disease.

Justin: I imagine, in the not-too-distant future, having tests at your annual physical where you get a readout of your microbiome and immune system that would result in clinically meaningful recommendations. To take it a step further: if you think of the continuous glucose monitoring that exists for people with diabetes, you could have something similar for your gut bacteria, like an in-toilet device in your home that would show how different foods—say, lamb chops versus broccoli—affect your microbiome. (Some companies offer at-home stool tests, but it's not clear what science they're using to make their dietary recommendations. It's very suspect.) Gut bacteria imbalance is associated with all kinds of Western diseases like type 2 diabetes, heart disease and obesity-related diseases. Prevention is usually an easier task than fixing a problem, so using diet to create the healthiest gut ecosystem possible, before a chronic illness has set in, has a much better chance for success than repairing a "broken" microbiota.

REIMAGINING LAND & SEA USE

THE EXPERT
Kathleen Merrigan, Ph.D., *executive director of the Swette Center for Sustainable Food Systems at Arizona State University, which focuses on food systems that drive economic productivity and social progress.*

Land is a fixed asset, and with a growing world population to feed, we need out-of-the-box solutions. Rather than deforesting the Amazon so we can plant more fields, there's going to be an acceleration and expansion of indoor agriculture of all kinds—greenhouses, aquaponics, aeroponics, hydroponics and vertical farming operations that require much less space, water and even soil to grow food. Some crops, like lettuce, don't need to be produced in the ground; we could save that land for crops that really have to be grown traditionally, like wheat and apples.

There's also a lot of innovation happening around insect protein. While much of the conversation is devoted to humans eating it—and there are plenty of cultures now in which people eat insects regularly—I think there's an important implication for fish consumption of these proteins. Currently, 6% of wild-caught fish are manufactured into fishmeal for farmed fish. Most of these wild-caught fish are among the tiniest of species and we are disrupting the ocean ecosystem by depleting them. This is as wacky a thing as I can think of, from an environmental viewpoint, when there are viable alternatives, like insects. These insects provide farmed fish the necessary protein at a very reasonable cost. It's time to think out of the box. (*For more on fish farming, see our story on Passmore Ranch, page 94.*)

"YOU COULD HAVE AN IN-TOILET DEVICE IN YOUR HOME THAT WOULD SHOW HOW FOOD AFFECTS YOUR MICROBIOME."

INSETS: MAR NA EYMANN (2); ARIZONA STATE UNIVERSITY

FIGHTING CLIMATE CHANGE WITH CROPS

THE EXPERT
Fred Iutzi, *president of The Land Institute, a nonprofit research organization in Salina, Kansas, dedicated to making agriculture sustainable through the use of perennial crops.*

Land Institute scientists are leading a movement to develop perennial grain crops and ultimately transform global grain production with them. (Perennials are plants that go dormant in the winter and resprout in the spring.) While our current crops produce abundant food, the plants are all annuals—meaning that farmers need to plant new seeds every year, disrupting the soil in the process. This and other modern agricultural practices are causing us to lose soil faster than it's being formed. Grain fields, for example, are losing soil about 16 times faster than new earth can be created. And that's a huge problem because all of our food supply goes back to the soil. It's the way plants get nutrition. It's this whole other ecosystem right under our feet.

Before our ancestors plowed up the native grasslands to create farm fields, we didn't have a soil-loss problem, in part because wild grains were perennials. If modern agriculture could mimic this ancient ecosystem, we could have the no-till sustainability of the prairie *and* help solve climate change.

Plants that grow back year after year have time to grow very long roots and this has a massive influence on the environment. On a basic level, these roots are simply better at holding down the soil, meaning less erosion and runoff. But plants also "breathe in" the greenhouse gas carbon dioxide from the atmosphere. This carbon ultimately becomes the plant's building blocks to grow seeds, leaves and roots—and to generate a bigger root system, the plant needs to suck up more CO_2 out of the air.

Bigger root systems also mean that the carbon *stays* buried deep in the earth. Annuals' shallower roots, on the other hand, can allow the carbon to escape right back into the atmosphere more easily, especially after the soil is turned over to plant a new crop.

After decades of careful research, we now have the very first early-stage perennial grain crop: a relative of wheat and barley called Kernza. Today there are about 1,000 acres of Kernza in commercial production in the U.S. Within 10 years we hope to increase that to hundreds of thousands of acres by teaming up with farmers and food companies. Patagonia Provisions sells a Kernza beer, and General Mills has developed a Kernza breakfast cereal under its Cascadian Farm label. We're also taking Kernza for a test drive in the artisanal market, working with a number of independent restaurants and bakeries.

In the future, we'll see things like vegetable oil made from perennial sunflowers, and hummus and bean soups made from perennial legumes. Eventually, you could fill your whole grocery basket. And you'd be doing it with an agricultural system that is a genuine source of solutions—not problems—for biodiversity, soil health and climate change.

IT'S ESTIMATED THAT KERNZA CAN REMOVE TWO TIMES MORE ATMOSPHERIC CARBON THAN ANNUAL CROPS—ABOUT 1.5 METRIC TONS PER ACRE ANNUALLY.

SOURCE: AGRICULTURAL AND FOREST METEOROLOGY

INSET: ©THE LAND INSTITUTE

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VIEWING FOOD AS MORE THAN NUTRIENTS

THE EXPERT **Dariush Mozaffarian, M.D., Dr.Ph.,** *dean of the Friedman School of Nutrition Science & Policy at Tufts University in Medford, Massachusetts. A cardiologist, his work centers on understanding how nutrition can prevent and treat obesity, diabetes and heart diseases, and on evidence-based policy to reduce these burdens in the U.S. and globally.*

The average consumer is looking for a simple, one-concept golden rule to make the right food choices—things like low-fat, low-carb or gluten-free. But this is at odds with where the research is going: toward complexity. We know the impact that individual nutrients can have, but researchers are *just* starting to scratch the surface of the health effects of whole foods. (Most people don't realize how new modern nutrition science is compared to other sciences. Vitamin C was discovered less than 100 years ago.) For instance, dietary guidelines have recommended low-fat dairy foods for decades—based mostly on theories about the benefits of isolated nutrients: get the calcium and vitamin D, avoid fat. Now we're starting to understand the complexity of the effects of probiotics in yogurt or the fermentation of cheese, and that dairy fat itself may have metabolic benefits. Milk, yogurt and cheese are really three different foods with very different effects on the body.

Or look at whole grains. Research shows that eating them has benefits like reduced inflammation, improved weight loss, lower LDL cholesterol and lower rates of heart disease, diabetes and possibly stroke. And yes, higher dietary fiber contributes to these benefits. But emerging evidence supports additional, independent contributions to health from other characteristics of whole grains—things like slower digestion as well as higher levels of minerals, phytochemicals and fatty acids. So the health effects of whole grains may result from the synergistic effects of multiple factors that are unlikely to be matched by fiber alone. In the future, people won't be making decisions about their diets based on isolated nutrients, but on the complex effects of foods on multiple pathways in our bodies, such as in our liver, brain, heart, fat cells, immune system and gut microbiome.

GROCERY STORES GROW THEIR OWN FOOD

THE EXPERT **Mike Lee,** *co-founder and co-CEO of Alpha Food Labs in New York City, a platform for building and launching new food products, and founder of Future Market, a food lab that evaluates the broader effects of today's food-related innovations, trends and behaviors over the next 25 years.*

The idea of a grocery store is becoming more flexible and accommodating to the varied needs of busy people. Soon, there will no longer *just* be a big building where all the food is and you have to go there to get it. You'll be able to order groceries from a touchscreen kiosk in the subway and have them waiting for you when you get home, delivered by a self-driving car. Stores are already working on these kinds of innovations, but like other technologies, the novelty will eventually wear off and it'll be the new baseline expectation. (Look at Uber: it initially felt like magic, but we're so used to it now that even a 6-minute wait feels too long.) Once that happens, retailers will need to compete on other elements. Because all this convenience chips away at why you'd want to put pants on and go to the store, I predict that the next big area of competition will be the in-store experience. As the restaurants, cafés and bakeries inside grocery stores get more interesting and delicious, people will start to think of the supermarket as that "third place" between home and work to hang out in, like Starbucks.

The prototype for this is a fleet of grocery store mega-centers in China, called Hema. Hema has all of the food items and home goods you would find in a Walmart. It's also an epic destination for people to eat—think live seafood tanks where you can hand-pick a fish or lobster that's cooked on the spot for you to eat in the dining room, served by a robot. And every item in the store is labeled with a QR code. Scanning a package of fresh meat, for example, brings up information on the animal's origin, producer, how it was raised, when it was slaughtered, where it was transported from and when it arrived at the store. Shoppers can also view ingredient information for

INSETS: KEVIN MA/TUFTS UNIVERSITY; THE FUTURE MARKET

premade foods, flavor profile descriptions and even reviews from other shoppers.

The real magic is how Hema gracefully wove together all of those individual technologies into one space. So what will be added next? Supermarkets are going to be tapping into advancements that will allow them to become places where food is actually grown and made. Indoor farming is already happening, and it's possible to improve and miniaturize that model and put it on top of a grocery store. So now your supermarket is also a farm. The same could happen with cellular agriculture, where beef is produced in the back of a Whole Foods without a cow. If the promises that these technologies have put forth come to fruition, it's conceivable that the grocery store might not need any goods from the outside world in order to produce food for its shoppers. That would change how supermarkets compete: each store would make its mark by *creating* products—not just reselling them.

INSETS: FEEDING AMERICA; INSTITUTE FOR THE FUTURE

ENDING HUNGER: WHERE TECHNOLOGY MEETS PARTNERSHIP

THE EXPERT
Claire Babineaux-Fontenot, *CEO of Feeding America, based in Chicago. With a network of 200 food banks across all 50 states, it is the nation's largest hunger-relief organization.*

In the United States, hunger is not about lack of food: 72 billion pounds of quality, nutritious food goes to waste each year. We have enough food; the problem is getting it to the 40 million Americans who struggle with hunger, before it gets wasted. Connecting surplus food to food-insecure people would help us make significant progress toward ending hunger—but such a feat requires partnership, innovation and perseverance.

It starts with harnessing the power of digital technology, especially smartphones. First of all, this strategy offers accessibility: more than 70% of households with income below $30,000 have a smartphone today and that number is expected to grow. It also helps streamline the process, all while offering new levels of confidentiality. Imagine a smartphone app that would allow a person in need to visit a restaurant or grocery store and receive food that would otherwise be wasted, at little to no cost.

For example, say a store knows that they normally throw away 10% of their rotisserie chicken. They could post "50 free chickens" on an app. Then a person could claim one through the app, come to the store and pick it up with the rest of their groceries. When they go to pay through the app—just like any other payment app—they simply won't be charged. All this would happen out of sight right in the same line with other paying customers, making it discreet and reducing the stigma associated with receiving charitable food (which can keep some people from accepting help that they may need). Y Waste is an emerging platform in Australia that is laying the groundwork for this, allowing food retailers to sell discounted surplus food through an app and let people just show the receipt when they come in to get it.

What's amazing is that much of the technology already exists to do these things. Now it's just a matter of using it in bigger, more innovative ways.

SMART SENSORS TRACK EVERY NUTRITIONAL DETAIL

THE EXPERT
Sarah Smith, *research director, Food Futures Lab at the Institute for the Future (IFTF), an independent, nonprofit research group in Palo Alto, California. She works with organizations and companies to explore how technology and social change will influence how people and communities pursue health and well-being.*

The holy grail of nutrition is the ability to accurately track every calorie and nutrient that enters our body through a portable or ingestible sensor. This would revolutionize nutrition research, since the self-reported diet journals many scientists currently use are notoriously unreliable. And I can imagine a future where nutrition tracking devices are commonplace and connected to health coaches on our phones, to preference filters for online food shopping or even to workplace wellness incentive programs. The transparency these devices create will also force food companies to clean up their recipes as people become more aware of just how much excess sugar, salt and other unhealthy ingredients are hidden in what they're eating. At this early stage, technology can't yet count calories, but the progress of what we *can* track is impressive. A research project out of Tufts University, for example, is using a 2-millimeter device that sticks on your tooth and tracks glucose, salt and alcohol intake. With this capability for detailed diet tracking, we will move away from one-size-fits-all understandings of nutrition toward a more personalized approach. Likely, we'll see early adoption of the next generation of sensors among people with diabetes or health conditions that really make it necessary to monitor diet. But as these trackers become better developed, cheaper and more accessible, they'll undoubtedly shift to a broader consumer context.

SOPHIE EGAN *is a San Francisco-based writer whose work on food and health has appeared in* The New York Times, The Washington Post, The Wall Street Journal, Time, Wired *and other publications. Her book*—The Conscious Eater: A Radically Practical Guide to Food Choices That Are Good for You, Others and the Planet—*will be published in spring 2020.*

FUTURE *of* FOOD

Just Don't Call Them GMOs

GENE EDITING

The tomatoes shown here were created with a cutting-edge gene-editing tool called CRISPR. Are foods like this the solution to better nutrition and food security in the face of climate change? **By Rowan Jacobsen**

PHOTOGRAPHY BY
DAVID MALOSH

On an otherwise chilly April morning, Zachary Lippman, Ph.D., and I stood basking in the artificial heat and humidity of a greenhouse at Cold Spring Harbor Laboratory—the famous Long Island research facility that pioneered the discovery of DNA—and stared at the future of agriculture. It was a tomato plant, but it was unlike any that has ever existed. Where most are long and leggy, this one was short and bushy. Where most string out their fruit on individual stems, this boasted dense clusters of bright-red cherry tomatoes, like grapes on a vine. Lippman, a plant geneticist with a buzzcut, beard and an infectious

enthusiasm for anything with leaves, created the plant using CRISPR, a new gene-editing technique that's revolutionizing plant breeding. And he believes this technology is at the forefront of a wave that—if consumers accept it—could make crops hardier, higher-yielding and more sustainable, plus make food that's more nutritious and delicious.

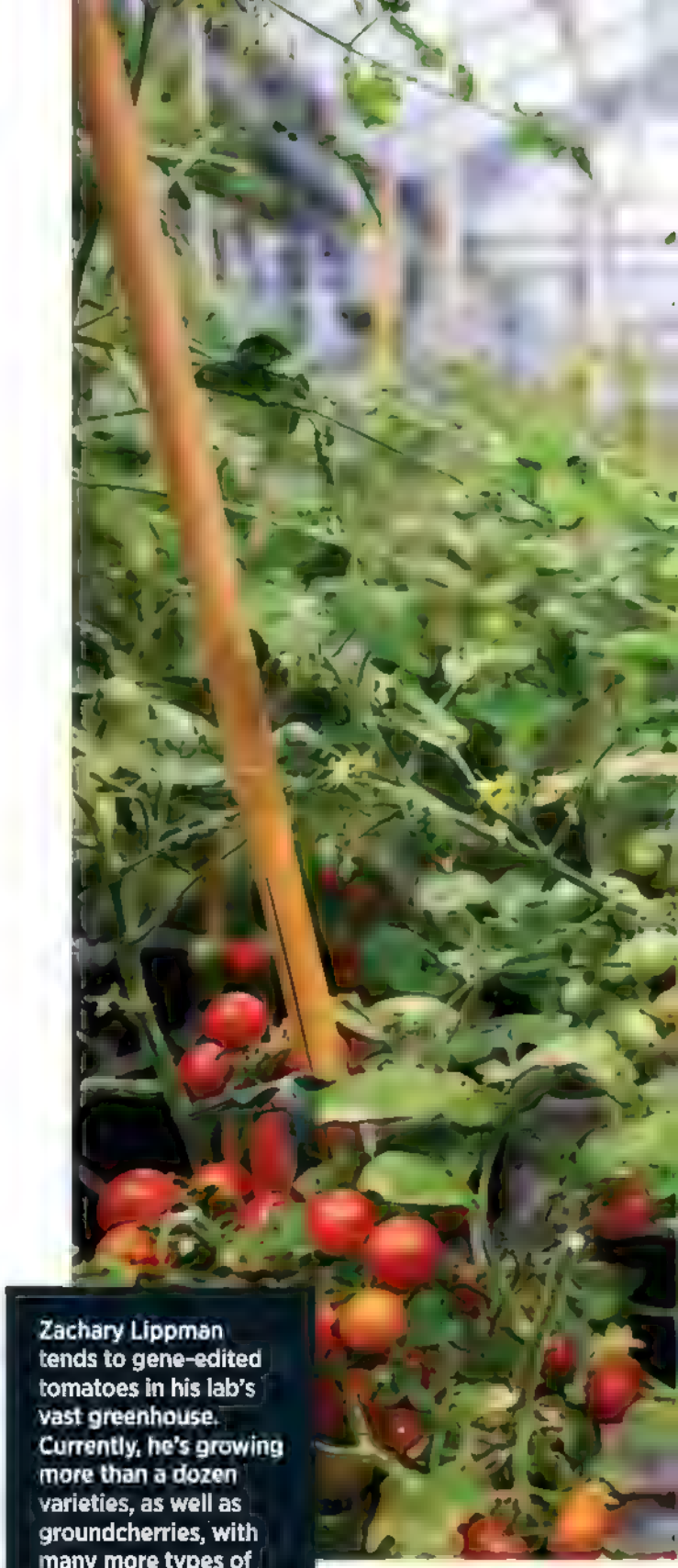
"Look at this cluster!" Lippman said, kneeling down to grab a handful of fruit. "This is an extreme example where we started with a cherry tomato that was very tall and made three gene edits." Tweaking the first two pieces of DNA made the plant short and prolific, and the third dramatically shrank the length of stem between each fruit, transforming the plant into a stubby, tomato-producing dynamo perfect for urban vertical farms, where crops are grown in a confined, indoor space. Vertical farming has several environmental benefits: it can reduce the food miles our produce travels (and the carbon footprint) and protect crops from weird weather like extreme storms or droughts (looking at you, climate change). It also requires a lot less land and resources than a traditional farm.

Breakthroughs like this tomato are the promise of CRISPR, which has been transforming the biological sciences—from medicine to agriculture—since arriving on the scene in 2012. CRISPR is a microscopic molecular tool that can be programmed to make precise changes to the DNA of any living thing. It is remarkably accurate and easy to use. (*See "CRISPR: Explained," page 78.*) The majority of earlier genetically modified crops (GMOs) involved shuttling entire genes between species and was so inexact that typical projects took years, but CRISPR and other gene-editing technologies can change individual letters of DNA in an existing organism, mimicking the kind of random mutations that breeders have historically depended on.

What really blew Lippman away is how fast it works. Where traditional breeders can require decades to make a new variety, patiently crossing and backcrossing different strains and hoping the right traits come together, he was able to take a cell from an old cherry tomato, change the traits he wanted using CRISPR, and grow new plants in a few months. (*See "4 Ways New Crop Varieties Are Made," page 79.*)

And even though one dwarf cherry tomato is not going to change the world, many experts believe that the kind of meticulous gene editing now possible will trigger a new green revolution in agriculture—and none too soon. Already, the world's farmers lose up to 25% of their harvest due to drought and heat stress. As climate change continues to sizzle, the number of crop failures will rise. But researchers like Lippman are beginning to design crops that can tolerate higher temps and produce more food using less water and fewer chemicals. And that could make the difference between a food-secure world and a much scarier one. In fact, a recent study published in the journal *Transgenic Research* found that the majority of the 114 experts surveyed (a mix of scientists, scholars, biotechnology pros and government officials) believe gene editing has the potential to improve crop yields, quality, climate resilience and global food security, and 68% agree it could help reduce agriculture's environmental footprint.

As I squatted to check out the shiny clusters of crimson fruit, I could feel the first churnings of a paradigm shift in my head. I'd always been skeptical of GMOs. But the more I spoke with Lippman and other plant people, and learned about techniques like CRISPR, the more I began to wonder if the old GMOs were just an awkward adolescent stage of the technology, and if this latest generation of plants might indeed make our food supply more sustainable, secure and delicious.



Zachary Lippman tends to gene-edited tomatoes in his lab's vast greenhouse. Currently, he's growing more than a dozen varieties, as well as groundcherries, with many more types of produce in the works.

THE ROOTS OF GENETIC MODIFICATION

Most people don't realize that ag giant Monsanto's embrace of genetic engineering in the 1970s and 1980s was supposed to help free farmers from their dependence on chemicals. The alarming hazards of DDT and other pesticides had become clear, and scientists at Monsanto began to experiment with ways to use genetics to incorporate natural forms of pest control into crops. Their first success was Bt corn and cotton, which contained a gene from a naturally occurring soil bacterium (*Bacillus thuringiensis*) that made the crops toxic to certain worms that infest them—but had no effect on other bugs or mammals. Bt crops reduced the amount of pesticides farmers had to use on these crops by up to 99%.

If Monsanto had continued down this path, the history of GMOs might have been very different. But instead, the company pivoted its focus to making crops resistant to Roundup, its blockbuster herbicide, by inserting a gene from another bacterium. Roundup Ready field corn (grown for livestock feed, ethanol and processed foods, as opposed to sweet corn) and soybeans were released in the 1990s. Farmers loved them. Instead of laborious and imprecise weed control, they could just spray their crops with glyphosate (the active chemical in Roundup) and kill them all. Today, most field corn and soy planted in North America is Roundup Ready, and global use of glyphosate has exploded.

Many consumers worry about the impact of all this herbicide residue on both their health and the environment, but there's another more fundamental concern. Taking a gene from an organism like a bacterium and transferring it to a

Gene editing works on animals too. Researchers have big plans for hornless cows (which wouldn't have to undergo painful and labor-intensive dehorning), chickens that are immune to bird flu, and pigs that don't get porcine reproductive and respiratory syndrome (which costs American farmers billions of dollars per year). Unlike plants, the FDA does regulate gene editing in animals—it currently applies the same rules as it does for GMOs—making it too expensive and time-consuming to bring most of them to market.

wildly different one like a corn plant just seems creepy. Might there be unintended consequences to mixing genes in ways nature never would have allowed? Despite scientists' assurances that GMOs are safe to eat, many consumers want no part of them. That hasn't prevented GMO corn, soy and canola from taking over the food supply, where they are fairly invisible and eaten every day. Fruits and veggies, however, have remained largely untouched. It can cost hundreds of millions of dollars to develop a GMO and shepherd it through the steep regulatory hurdles the USDA imposes on transgenic crops. And considering the likely public backlash, few companies are willing to risk it.

But when Lippman read the first papers on CRISPR, he knew that crop breeding had changed forever. "I grabbed a sticky note and wrote 'promoter CRISPR' and stuck it to my desk. There were things that I'd always wanted to try, but I'd pushed them to the back of my mind because there were no tools to do them. As soon as the studies hit, those ideas—like promoter CRISPR—went right to the front. It's a wicked exciting time," he said as we examined dozens of gene-edited tomatoes in the Cold Spring Harbor greenhouse.

Every gene in plants and animals, he explained, comes with a piece of DNA called a promoter, which controls the energy of that gene. If the gene is the car, the promoter is the gas pedal. By using CRISPR to fiddle with promoters, Lippman could make any gene run fast, slow or not at all. It would be much easier to do, and importantly, there would be no foreign genes in the plant—because he'd be tweaking the tomato's own DNA. All these changes were things that might occur naturally if a breeder got very, very lucky. Lippman hoped this would make gene-edited crops less disquieting to consumers and federal regulators.

Last year, the USDA confirmed that it won't treat these crops any differently than traditional ones, stating that "USDA does not regulate or have any plans to regulate plants that could otherwise have been developed through traditional breeding techniques," because the agency considers these newly created plants "indistinguishable from those developed through traditional breeding methods." That hugely reduces the time and money required to bring a gene-edited food to market, making it viable for smaller specialty crops and independent companies—meaning we're going to see lots of them. Already in the works: disease-resistant cacao and bananas, caffeine-free coffee beans, flavor-boosted strawberries and

CRISPR: EXPLAINED

CRISPR is the catchy acronym for a decidedly uncatchy term: Clustered Regularly Interspaced Short Palindromic Repeats. In 2012, a team of scientists at the University of California, Berkeley, led by Jennifer Doudna, Ph.D., a professor of chemistry and molecular and cell biology, discovered how to use CRISPR to make targeted gene edits in virtually any organism.

1 Scientists identify the gene for a trait they want to edit.

2 They then design a strand of guide RNA (a molecule that can locate and read the genetic information contained in DNA) to match the exact sequence of DNA in that gene. An enzyme—typically one called Cas9—that acts as a kind of molecular scissors, is attached to the RNA.

3 The CRISPR construct is added to a test tube or petri dish along with the cell to be edited.

4 The guide RNA searches the cell's genome until it finds the matching sequence of DNA—sort of like picking a suspect out from a (very large) police lineup—then locks on.

5 The Cas9 "scissors" then snip the DNA at that exact point. If scientists simply want to disable the gene, that's enough. But they can also make an edit by adding a new piece of DNA with the sequence of a new trait they want.

6 Cells have natural repair enzymes that stitch broken DNA strands back together. If a new piece of DNA has been added, it will be stitched into the gap, changing the gene.

7 As the cells reproduce, they will all have the new DNA and express the desired trait.

ILLUSTRATION BY JING ZHANG

tomatoes, nonbrowning mushrooms and apples, and many more. *(See "Grocery Shopping Is About to Change," page 80.)*

Some of the most promising gene-edited crops are coming from Calyxt, a Minnesota company that uses a technique similar to CRISPR, called TALEN. In February, the company began selling the first gene-edited food, a soybean oil called Calyno that's made from soy but has a fat profile similar to olive oil. Other crops in development at Calyxt include a higher-fiber wheat, alfalfa that livestock can more easily digest (resulting in lower methane emissions), a canola oil with an even-healthier fat composition and a potato that can better withstand cold storage.

But will people eat them? Many consumers and advocacy groups remain deeply suspicious of gene editing. In a 2018 Pew Research Center survey, 59% of respondents said they believe GM foods will lead to health problems and 56% deemed them bad for the environment. (Although 76% said they could increase the global food supply.) Leading the anti-CRISPR fight on the nonprofit side is Friends of the Earth, which published a report in 2018 titled *Gene-Edited Organisms in Agriculture: Risks and Unexpected Consequences.* As co-author of the report Dana Perls explained, "New genetic engineering techniques like gene editing are risky... [and these] new GMOs must be properly assessed for health and environmental impacts before they enter the market and our food system." Among the concerns the report details is that CRISPR may create unintended genetic changes or errors, or alter important genes in a way that has safety implications for human health and the environment.

Are they really fundamentally dicier than traditionally bred crops, though? Not necessarily. As Lippman pointed out to me, the type of changes CRISPR makes are exactly what's been happening in our crops for thousands of years, resulting in bigger fruits or seeds, better yields and more predictable growth. Mutations happen every time an organism reproduces: of the billions of letters of DNA in its genome, thousands get miscopied and occasionally something amazing results. That's what drives evolution. So worrying about a single edited gene, Lippman said, makes no sense. "It's one mutation in a sea of ones that already exist. Every plant you eat contains thousands of new mutations," he shrugged. "How do you feel?"

Megan J. Palmer, Ph.D., a senior research scholar at Stanford's Center for International Security and Cooperation, who is an expert on assessing the dangers of new technologies, agreed. "Risk is relative," she told me. "We tend to underestimate the risks of familiar technologies and overestimate the risks of new ones. Traditional breeding can introduce more random mutations than gene editing does." Palmer said we also need to consider the changing context in which we assess new techniques: "We know that we're going to be confronted with all sorts of risks in the future, such as those accompanying climate change. If these technologies might help to manage them, that's an important consideration."

BEYOND TOMATOES AND MUSHROOMS

No matter how many experts affirm the safety of gene-edited foods, for consumers the creep-factor looms. That's why the most promising engineered organism in agriculture might be one that people don't have to eat at all. It's a microbe called Proven, and it's what North Dakota farmer Chad Rubbelke treated his wheat seeds with before planting them this spring.

Rubbelke farms 3,000 acres of durum wheat, soybeans, sunflowers, canola and flax on land that goes back in his family for generations. But he's part of a new wave of young, environmentally conscious, tech-savvy farmers who are shaking things up in the Midwest, and he thinks Proven can greatly reduce the use of nitrogen fertilizer, which is one of agriculture's biggest environmental problems.

Nitrogen is essential for plant growth, and our fast-growing crops require an intense supply of it. But only about half of the 120 million metric tons of fertilizer applied each year actually make it into crops. "Getting nitrogen into the ground is probably the biggest headache a farmer has," said Rubbelke. "It's expensive. And to get it on at the right stage is next to impossible." If conditions are too wet, it runs off into rivers, where it causes dead zones that choke the life out of the seas they empty into. If conditions are too dry, it vaporizes into the air and becomes a major greenhouse gas. By EPA estimates, fertilizer application produces 74% of all U.S. emissions of nitrous oxide—a particularly noxious form of greenhouse gas (it's 300 times more potent than carbon dioxide). Forgoing that fertilizer, however, is not currently an option; without it, we'd only produce half as much food, and 3 billion people worldwide could go hungry.

Proven may change that. In the fluorescent-lit grow room of a Berkeley, California, startup called Pivot Bio, I examined dozens of corn and soybean plants in sand-filled boxes. Living symbiotically

4 Ways New Crop Varieties Are Made

HOW GENE EDITING IS DIFFERENT FROM GMO AND OTHER PLANT-BREEDING METHODS

TRADITIONAL BREEDING

First employed: Since humans began cultivating plants (around 23,000 years ago).
How it works: Breeders cross-pollinate two varieties of the same species. The resulting seeds have a mix of genes from the two parents, along with normal random mutations. Breeders grow them and select the plants with the most desirable traits. This method also includes hybrids, which began in the 1920s: two completely different plants are crossbred to produce offspring that have traits from both parents, such as crossing a lemon with a mandarin orange to make a Meyer lemon. (Heirlooms, on the other hand, are propagated through open pollination—letting plants go to seed and then saving and replanting those seeds. Occasionally, natural mutations occur and farmers select for the traits they like and grow those new varieties.)
Number of genes affected: A few genes to entire genomes.
Federal regulation: None.
Used on: Almost everything we eat.

MUTAGENESIS

First employed: 1950s
How it works: Seeds are exposed to radiation and/or chemicals to produce mutations in their genes, then germinated. Breeders select the most interesting results (which are unpredictable) and crossbreed them with existing varieties.
Number of genes affected: Hundreds to thousands.
Federal regulation: None.
Used on: Many common foods, such as red grapefruit, rice, cacao, barley, wheat, pears, peas, peanuts and peppermint.

GENETIC MODIFICATION

(aka GMO, or transgenics)
First employed: 1980s
How it works: Genetic engineers isolate an entire gene from one species and insert it into an entirely different species.
Number of genes affected: One to eight.
Federal regulation: High
Used on: Crops such as field corn, soybeans, canola, eggplant and papaya.

GENE EDITING

First employed: 2010s
How it works: Genetic engineers use CRISPR or other molecular tools to make specific changes in the DNA of individual plant cells.
Number of genes affected: One or more.
Federal regulation: None
Used on: About 25 foods so far, including rice, corn, wheat, citrus, potatoes and coffee.

ADAPTED FROM: THE GENETIC LITERACY PROJECT

Grocery Shopping Is About to Change

THESE ARE SOME GENE-EDITED FOODS YOU COULD SEE OVER THE NEXT FEW YEARS

Disease-Resistant Bananas	**Why:** To protect Cavendish, the main commercial banana variety, from devastation by diseases, including one caused by a fungus called *Fusarium*.
Drought-Tolerant Soybeans	**Why:** To maintain global food production during hotter, drier summers.
Compact, High-Yield Tomatoes	**Why:** To advance vertical farming and reduce land requirements on traditional farms, increase yield, reduce food miles, improve drought tolerance.
Bigger, Hardier Sweet Potatoes	**Why:** To improve food security in Africa. The sweet potatoes will also have boosted levels of beta carotene to treat vitamin A deficiency.
High-Yield Rice	**Why:** To improve food security in Asia.
Disease-Resistant Cacao	**Why:** To knock out a gene, making the plant immune to a pathogen that currently destroys 20-30% of cacao pods annually.

on their roots were Proven microbes (which had been applied to the seeds). They have been designed to continuously pull nitrogen from the air—something most plants are incapable of doing on their own—and spoon-feed it directly to the plants' roots. In the natural world, some microbes do this in modest amounts, but gene editing has kicked the process up several notches. As the plants grow, the microbes colonize and provide a steady diet of nitrogen without losing any to the water or air. And while Proven can't make enough nitrogen to completely replace the use of fertilizer, its impact could still be huge.

That got Chad Rubbelke's attention. "I was sold! Something that's nonchemical and can help the environment could be a big player on our farm," he said. "If we can use a microbial to get the nitrogen bump when we need it without having to apply it ourselves, it could relieve 50% of our fertilizer needs." That, in turn, would significantly reduce nitrogen runoff and greenhouse gas emissions. By midsummer, he'd already seen results in his wheat crops too. "When we took samples, every single one showed a noticeable difference from the untreated wheat," said Rubbelke. "The Proven wheat was noticeably taller and had a larger root mass. It was exciting and I hope these results lead to greater yield in the end."

Research Pivot Bio has conducted suggests that if a third of America's corn farmers adopted Proven, it would be the greenhouse-gas equivalent of taking nearly 1.5 million cars off the road and could prevent 500,000 metric tons of nitrates from leaching into waterways. When I sat down with Pivot Bio CEO Karsten Temme, Ph.D., at a conference table near the grow rooms, he told me so far, so good: "In 2018, we tested Proven with a few dozen farmers. We said, 'Try our product and see what you think.' Every single one of them has already signed up to be a commercial customer this year. We were blown away." The company could only produce enough Proven to supply a few hundred growers in 2019, but with investors such as Bill Gates' Breakthrough Energy Ventures backing it, Temme expects to expand to thousands in 2020.

Pivot Bio has numerous competitors in the field of engineered "biologicals"—microbes and enzymes that bolster plants in various ways. While several are trying to crack the fertilizer problem, others aim to help plants tolerate stress from heat or drought. "Microbes are like an extension of the plant's immune system," Temme explained. "They can help it withstand climate change and make the whole ag system more resilient and sustainable." Other biologicals are being designed to fight weeds. And when that happens, Rubbelke said, he'll be first in line: "We don't like using herbicides as much as you guys don't like hearing about them!"

TOWARD A MORE DIVERSE FOOD SYSTEM

As excited as Lippman gets about the new tomatoes he's making, the thing that excites him most about CRISPR isn't tomatoes at all. "Come look at this," he said, leading me to another part of the greenhouse where a scraggly hedge dominated one wall. "You're looking at the wild ancestor of tomatoes. In its native environment of Central and South America, the tomato is not an annual. It's a tall, bushy, woody perennial." He lifted a leaf to reveal a tiny green nubbin. "See this little fruit right here? It's not going to get bigger than a tiny marble."

Over thousands of years, growers were able to increase the size of the tomato by continuously selecting plants with mutations that made larger fruits—but right up until the 1920s, most tomatoes were sprawling. Then a Florida farmer discovered a plant with a freak mutation that made it compact and densely fruited, and it engendered the modern tomato industry. Suddenly they could be grown as row crops and easily harvested. Most commercial varieties are descended from that original plant.

And that's how it is for most of our food crops, Lippman told me. Each depended on rare mutations to turn them into something that could be farmed. "Of the hundreds of thousands of plant species, tens of thousands are edible," he said. "We probably eat a few hundred." In other words, for every tomato or artichoke that became domesticated, another 500 edible wild fruits and vegetables didn't. And for every useful gene we've drafted into agriculture, another 500 are sitting on the sidelines. Who knows what fresh ways to address drought, heat, disease, pests, nutrition, flavor and other future challenges might be found in all that accumulated natural wisdom?

"We're opening up these reservoirs of genetic diversity in nature!" Lippman exclaimed, hustling me across the greenhouse to look at two sprawling shrubs. "I think there's real potential to make this a major berry crop." Dangling beneath the leaves of one plant were papery lanterns, each holding a single, small fruit. They were groundcherries, tasty wild plants that naturally produce just one fruit per branch. "I love the flavor of these things," Lippman said. "But they're the worst producers imaginable and they take forever to fruit. It's a nightmare. But we can make them more compact, flower faster and have more concentrated fruit."

Sure, it's just a groundcherry (OK, maybe a *delicious* groundcherry), but if CRISPR can put them in the supermarket at a decent price, who knows what else it might add to our repertoire?

Lippman picked a groundcherry, peeled back the lantern, and handed it to me. "Smell it. They're so good. All those pineapple and vanilla scents." Standing there in that glassed-in garden, I held the fruit up to my nose and debated whether to take a bite. It smelled strange but alluring, new and yet deeply familiar, like something from our primeval past. I was all in.

ROWAN JACOBSEN *is the author of several books, including* American Terroir. *He received a James Beard Award for his* EatingWell *feature "Or Not to Bee."*

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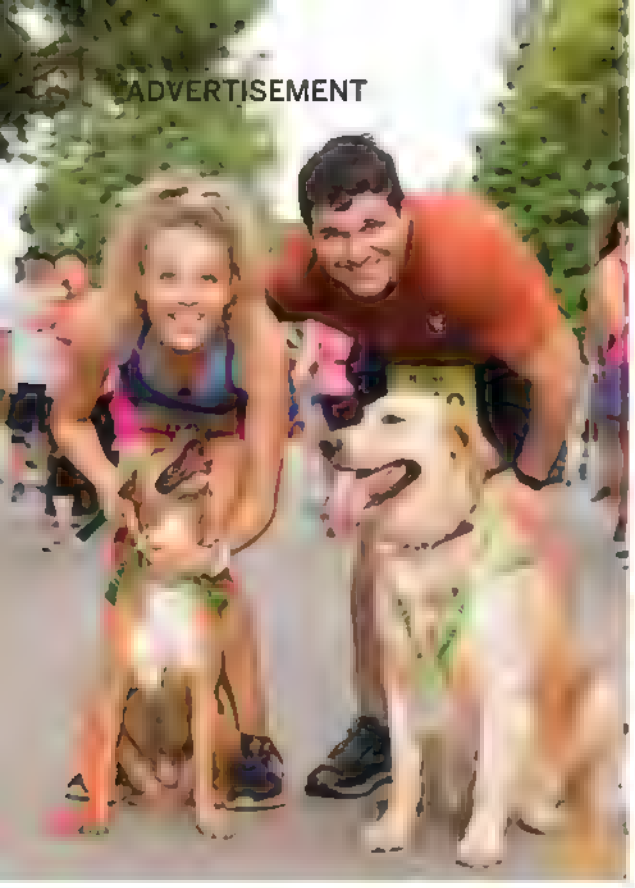

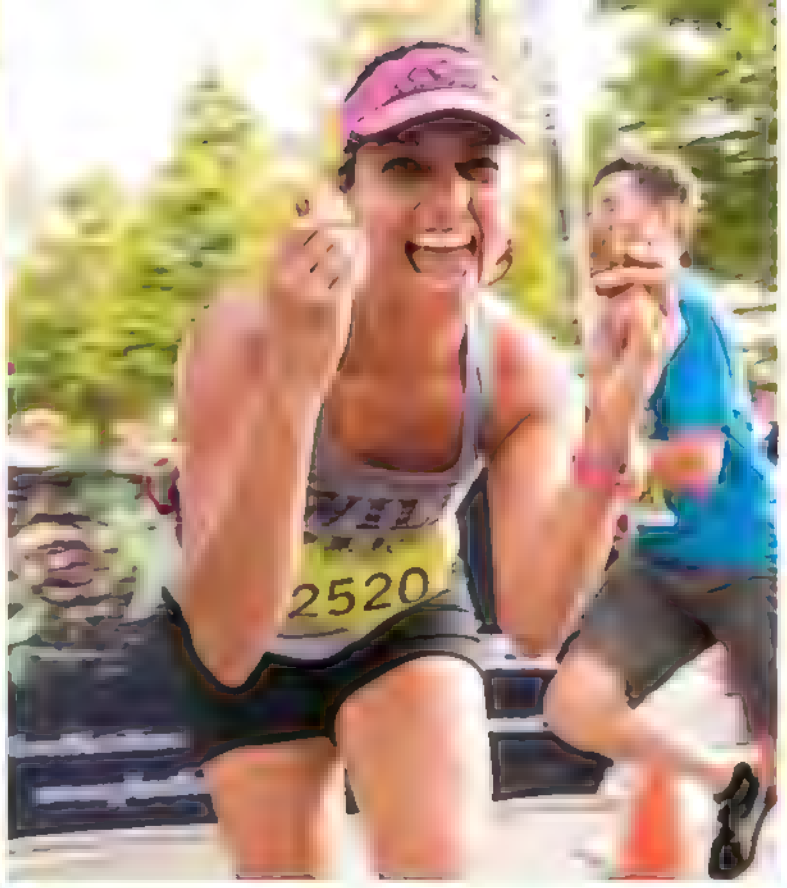

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The Kitchen of Tomorrow

COOKING

From robotic sous chefs to compact, light-powered ovens that cook in a third of the time, there's no doubt about it, your next kitchen could be pretty epic. **By Adam Bluestein**

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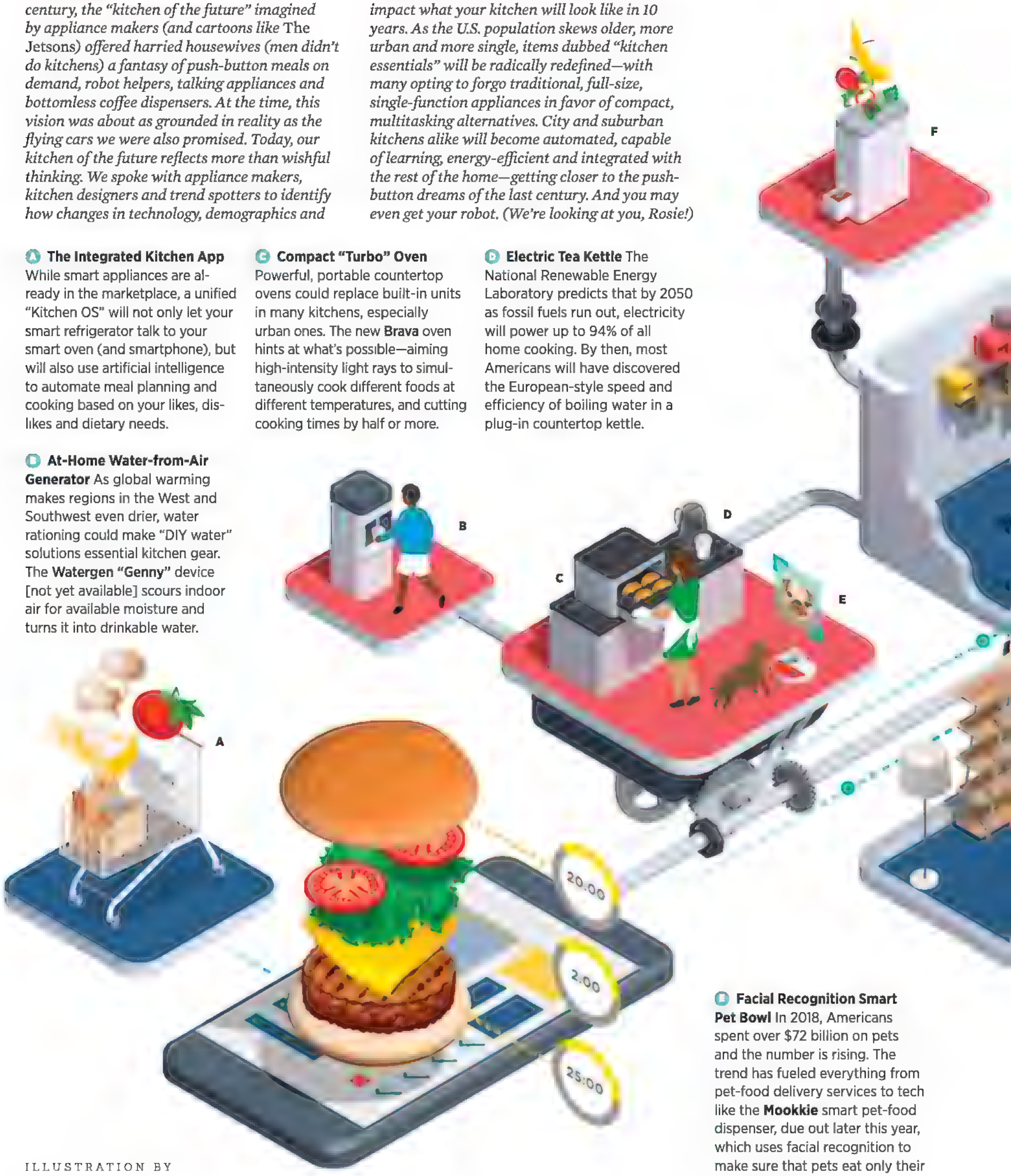
IN THE SPACE-AGE EUPHORIA *of the mid-20th century, the "kitchen of the future" imagined by appliance makers (and cartoons like* The Jetsons*) offered harried housewives (men didn't do kitchens) a fantasy of push-button meals on demand, robot helpers, talking appliances and bottomless coffee dispensers. At the time, this vision was about as grounded in reality as the flying cars we were also promised. Today, our kitchen of the future reflects more than wishful thinking. We spoke with appliance makers, kitchen designers and trend spotters to identify how changes in technology, demographics and lifestyle—not to mention the climate—will impact what your kitchen will look like in 10 years. As the U.S. population skews older, more urban and more single, items dubbed "kitchen essentials" will be radically redefined—with many opting to forgo traditional, full-size, single-function appliances in favor of compact, multitasking alternatives. City and suburban kitchens alike will become automated, capable of learning, energy-efficient and integrated with the rest of the home—getting closer to the push-button dreams of the last century. And you may even get your robot. (We're looking at you, Rosie!)*

A The Integrated Kitchen App While smart appliances are already in the marketplace, a unified "Kitchen OS" will not only let your smart refrigerator talk to your smart oven (and smartphone), but will also use artificial intelligence to automate meal planning and cooking based on your likes, dislikes and dietary needs.

B At-Home Water-from-Air Generator As global warming makes regions in the West and Southwest even drier, water rationing could make "DIY water" solutions essential kitchen gear. The **Watergen "Genny"** device [not yet available] scours indoor air for available moisture and turns it into drinkable water.

C Compact "Turbo" Oven Powerful, portable countertop ovens could replace built-in units in many kitchens, especially urban ones. The new **Brava** oven hints at what's possible—aiming high-intensity light rays to simultaneously cook different foods at different temperatures, and cutting cooking times by half or more.

D Electric Tea Kettle The National Renewable Energy Laboratory predicts that by 2050 as fossil fuels run out, electricity will power up to 94% of all home cooking. By then, most Americans will have discovered the European-style speed and efficiency of boiling water in a plug-in countertop kettle.



E Facial Recognition Smart Pet Bowl In 2018, Americans spent over $72 billion on pets and the number is rising. The trend has fueled everything from pet-food delivery services to tech like the **Mookkie** smart pet-food dispenser, due out later this year, which uses facial recognition to make sure that pets eat only their own kibble.

ILLUSTRATION BY JING ZHANG

◀ OPEN THE FLAP TO SEE THE FUTURE

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F Composting Device Small electric composters like the **Zera Food Recycler** could be a mainstay of kitchens, drastically reducing waste by churning food scraps—including meat and dairy—into house-plant-ready compost overnight.

G Kitchen "Co-bot" By 2030, robots like **Samsung's Bot Chef** (shown at this year's Consumer Electronics Show) will chop, mix, lift and pour in many homes, a game-changer for the 61% of older adults who want to age at home but will need help with the physical demands of cooking.

H 3D Food Printer In 10 years, devices like the countertop 3D printer now available from **Foodini** will reduce waste by "up-printing" day-old bread or "ugly" produce into baked or dehydrated snacks. On a larger scale, this model will help ease food insecurity.

I Countertop Dishwasher As the numbers of untethered apartment dwellers, singles and seniors in Europe grow, a "BYO appliance" trend is taking off, says Richard Hoare, design & innovation director at Breville. By 2030, devices like Heat-works' **Tetra countertop** (and portable) **dishwasher** will be common in the U.S. too.

J RF Oven Full-size ovens will be automated, connected, multifunctional and fast. **Miele's** new **Dialog** is the first consumer appliance to employ radio-frequency (RF) technology, using electromagnetic waves to cook food precisely and up to 70% faster. Electric heating elements ensure professional results when baking and roasting.

K Multitasking Water Faucet By 2030, specialty faucets (like **Zip Water's** new **HydroTap Celsius All-in-One**) will provide chilled, boiling and carbonated water—even milk or coffee—on demand. Concerns about municipal water supplies will lead to adoption of advanced filtration systems that include toxin sensing.

L Personal Pots and Pans Today, some 28% of American households are just one person, up from 13% in the 1960s. This demographic is expected to continue growing and manufacturers will respond with offerings ranging from mini appliances and food portions to personal-size grill pans and Dutch ovens.

M Kitchen Island As lines between kitchen and living room continue to blur, the island will remain at the center, surrounded by "lounge-y" couches, coffee tables and even carpeted floors. Adding to the ambiance, finishes that mimic timber or stone will allow appliances to blend into the living space seamlessly.

ADAM BLUESTEIN *writes about innovation in business and technology, health care, sustainability and food. He is a frequent contributor to* Fast Company *and* Inc.

BRIGHT IDEAS FOR A BETTER KITCHEN

Of all the living spaces in a home, the kitchen is most definitely the favorite room in the house. It's THE destination for gatherings, mealtimes, and socializing with family and friends. So why not make this room the best it can be? With these bright ideas from the **Mrs. Meyer's Clean Day®** brand, your kitchen will live up to its full, squeaky clean potential!

5 things you can do to better your kitchen, starting today!

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2. Compost Your Food Scraps
Reduce the amount of garbage your kitchen produces AND create nutrient-rich soil for the garden. It's a win-win.

3. Dedicate Space to Recycling
An attractive, functional, and organized space will set your family up for recycling success.

4. Plant Your Own Herb Garden
A countertop herb garden is a deliciously green addition to the kitchen. It's a simple way to brighten up the room, plus it provides easy access to fresh herbs all year long.

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FUTURE *of* FOOD

Eating for Your Genes

PERSONALIZED NUTRITION

Nutrigenetics—that is, matching your diet to your DNA—is touted as the future of wellness and disease prevention. But do we all really need special, customized eating plans? **By Patrick Clinton**

Way, way back when the human race was young—sometime after the age of dinosaurs, but before the invention of salad forks and pants with pockets—our ancestors never devoted one second to wondering what they ought to eat. They ate what they *could*. And that depended on where they lived. If there were fruits, leaves and insects, that's what was on the menu. Ditto if there were caribou and walruses in the neighborhood. There was no other choice.

Over time, human beings in different nutritopes (the fancy science term for areas defined by what's available to eat) adapted to get the most out of their diets. A walrus eater would be born with a genetic mutation that kept her heart healthy despite the saturated fat in the blubber she ate. And eventually, through natural selection, almost all the babies in her village would have the same gene variation, called a polymorphism—a mutation that has become well-established in a population. Through a similar

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Broccoli
FADS2 rs174575
GG GENOTYPE
TOP FOODS
Mackerel
Salmon
Herring
BCMO1 GENE
AT GENOTYPE
TOP FOODS
Egg yolks
Cod liver oil
Butter

process, herders in Northern Europe mostly ended up with a genetic mutation that let them continue to digest lactose as adults, while the rest of the world mostly didn't. And Polynesians who went on long sea voyages developed the ability to function with less vitamin C than the rest of us—helping them fend off scurvy.

But then things changed. Across the planet, people pulled on their pants, put their salad forks in their pockets and left the old neighborhood. They crossed continents, navigated oceans and intermarried with everybody they met along the way. They also killed off game, cut down forests and invented modern agriculture—as well as sliced bread, refrigerated trucks, supermarkets and Big Macs. By the time they got done, the old nutritopes were largely gone or changed beyond recognition, and most of us were a genetic muddle, not necessarily optimized for *any* traditional diet.

However, those genes we inherited from our ancestors are still in there. So it makes sense that if you could figure out which ones you carry, you could align your diet with the sweet spots they create and get healthier, happier and thinner.

Science has been chipping away at that idea for a long time, arguably since the early days of the 20th century, when Archibald Garrod discovered that alkaptonuria, a disease that prevents the body from processing certain proteins, was inherited. The field he created—"inborn errors of metabolism"—eventually led to the birth of nutrigenetics and nutrigenomics, the twin sciences of how your genes interact with the food you eat and, in turn, affect your health. (What's the difference? Nutrigenetics is more about health impacts; nutrigenomics has to do with the molecular nuts and bolts of *how* those impacts happen.)

And nutrigenetics has been making pretty remarkable progress recently—especially considering that each person has between 20,000 and 25,000 genes, consisting of 3 billion base pairs of DNA. For those who need a refresher: Your DNA is a big instruction manual for

OLIVER PARINI; PREVIOUS SPREAD: RAWPIXEL LTD/ALAMY STOCK PHOTO

"WILD BOAR & TIGER NUTS?"

WHAT I LEARNED FROM MY NUTRIGENETICS TEST BY LUCY M. CASALE

"Your Nutrition Genome Report Is Ready!" After seven weeks of waiting, the email had arrived in my inbox and I wondered what potentially life-altering diet insights I was about to uncover. (I'm an editor here at *EatingWell* and had volunteered to play guinea pig.) The company that did my report, Nutrition Genome, offers a 50-plus-page analysis *($300; nutritiongenome.com)* that includes, among other things, a rundown of genetic "strengths" and "weaknesses," plus a personalized grocery list based on your DNA. *Cool!* And also, honestly, a little bit terrifying. Call it the fear-of-the-unknown factor. Some of my strengths:

Thanks to my APOA2 gene, I'm less likely to gain weight from eating saturated fats. ***Good news, since I'm a total turophile.***

Because of my "improved FTO gene function," I'm more apt to have normal levels of ghrelin (the hunger hormone), decreasing my risk for overeating and abdominal weight gain. ***Also good news, since I'm hoping to fit into my wedding dress in less than a month.***

And my NOS1 gene may help lower the inflammatory process from psychological stress. ***Work deadlines? Bring 'em on!***

Next up, my genetic minuses: Because of my BCMO1 gene, I may have a reduced conversion rate of plant-based beta carotene to vitamin A: "This increases your need for foods higher in vitamin A like eggs, cod liver oil, wild salmon oil and organ meats for skin, digestion, healthy eyes, lungs and immunity." ***OK, good to know.***

I may have reduced PON1 gene function "for pesticide detoxification, and HDL and LDL oxidation." Luckily, there are "numerous strategies to improve PON1 including choosing organic foods, adequate calcium and magnesium, broccoli sprouts, high-quality olive oil, and a glass of red wine." ***Cheers to that!***

Due to variants in GATA3, I could have increased sensitivity to processed meats and, as a result, colon cancer risk. I should "reduce processed meat intake, optimize vitamin D levels and increase berries, apples, sauerkraut, broccoli, tomatoes, basil, rosemary, garlic, onions and leeks." ***Adding sauerkraut to my shopping list; scratching off pepperoni.***

The DNA-based grocery list I was given based on all of this featured many foods that are already regulars in my diet—bananas, olive oil, yogurt, berries, spinach and wild salmon. But an equal number were totally foreign, like wild boar, tiger nuts, yacon syrup, bilberry, pastured lard ***(??)*** and heart.

And while the report gave some fascinating insights into my genetics, it also felt like information overload and I wasn't sure what to do with it. *EatingWell* advisor David Katz, M.D., to whom I forwarded my report for input, was less impressed. "The recommendations are dubious," he told me. "For example, the possibility of some relative inefficiency in making vitamin A led to the recommendation to eat organ meats—with no consideration of how this would affect health overall, or interact with the many other suggestions. And the magnitude of these effects is entirely unclear. In some cases, the genes in question may exert a major effect, and in many, they could have a very minor effect. There's no basis to differentiate." To me, the results were nice to be aware of, but not worth changing my whole diet for—until nutrigenetics tests advance more, anyway. Maybe I'll take the test again in 2040.

building and operating a human body written in four chemical bases or "letters"—the molecules known as G, T, C and A. Changing a single letter can be enough to alter how your body works. A change that's well established among humans—like the walrus-eating thing I mentioned—is most commonly a single-nucleotide polymorphism, or SNP. Although there are other types of polymorphisms, SNPs are the primary thing that nutrigeneticists look at, and the average human has 4 to 5 million of them.

Science has made hundreds of links between genes, diet and physical outcomes. We've learned that a variation in a gene called FTO predisposes people to obesity. We've learned that those with a particular alteration in the gene APOA2 lose more weight when they reduce saturated fat in their diet compared to people without the variation. And we know that more than 10% of American women have a variation in the gene MTHFR that can lead to birth defects like spina bifida in their babies, unless the pregnant women supplement their intake of folate.

When you think of how little we knew about this sort of thing even a decade ago, the growth of nutrigenetics has been absolutely explosive. On the other hand, when you think of how much there is *still* to know, it's another story. There are more than 100 million known SNPs and an estimated 25,000 bioactive substances in food—compounds that aren't essential nutrients, but that can affect the way your body operates, including things like lycopene, resveratrol, tannins and basically every unfamiliar name you see in an article about The Next Miracle Nutrient. It's going to take some time to get through them all and understand how they play together.

But wait. Can't you already get personalized diet recommendations based on your genes from a zillion different spit-in-a-tube DNA testing companies? Well, it's true that a bunch of them—including Habit, Orig3n and 23andMe—offer a panel of tests related to health and nutrition *(see "Wild Boar & Tiger Nuts," left)*. Typically, they look at SNPs in 20 or 30 genes and tell you things like if you're lactose-intolerant, whether you're prone to a half-dozen vitamin deficiencies, how you metabolize caffeine, alcohol and different kinds of fats, and if you carry a gene that makes cilantro taste weird to you. It's interesting, I guess, but the advice—especially after the Food & Drug Administration cracked down on the consumer-DNA industry a few years back—tends to be extremely cautious and not really all that personalized. So, yes, it's nutrigenetic advice. But only in the same sense that the Speak & Spell you had when you were a kid is a laptop computer.

Real personalized nutrition still faces some big hurdles. First, there are a lot of SNPs to test to see what they do. Then there's the enormous problem of figuring out which of the discoveries are real and which are experimental error or a statistical glitch. Martin Kohlmeier, M.D., Ph.D., a nutrition research professor at the University of North Carolina, notes in his book *Nutrigenetics: Applying the Science of Personal Nutrition* that most of the new results that get published won't ultimately pan out.

And a lot of the things we "know" now will unfortunately fall into the same category. A few years back, for example, researchers analyzed more than 600 genetic association studies. Only about one study in six had its results confirmed in a follow-up paper and just 1% of the 600 were replicated twice or more (a sign that, scientifically, you're really onto something). Let's be optimistic and say that study results will be confirmed half the time. That leaves 500 coin flips. "The industry makes it seem like personalized nutrition is ready for prime time and it's not," says *EatingWell* advisor David L. Katz, M.D., M.P.H, director of Yale University's Yale-Griffin Prevention Research Center and author of *The Truth About Food*.

But even when the knowledge base about genes and diet gets more solid—and leaders in the field believe that might only be a few years off—there will be the

"IT'S *HOMO SAPIENS* ARROGANCE TO THINK WE CAN'T KNOW WHAT TO EAT UNTIL WE'RE ALL INDIVIDUALLY PROFILED—BECAUSE WE'RE ALL SO UNIQUE AND SPECIAL."

—DAVID KATZ, M.D., M.P.H.

question of what to do with it. A personalized diet sounds like a wonderful thing, but as Kohlmeier points out, if you go beyond one or two genes, things can get complex. Imagine, he says, that you're trying to adjust your diet to meet nutrition needs based on a handful of gene variants: say, total calories need to come down by 8%, sodium by 20% and saturated fat by 50%. You need to up your total folate and vitamin C by 50%, reduce your folic acid by two-thirds and get your calcium/magnesium ratio under 2.6.

So, what's for dinner?

Most of us, working with real-life ingredients—tomatoes and greens and pork chops—would have a hard time translating that information to our plates. And it's not clear that we even have to deal with every message we get about our genes. Many SNPs, taken individually, aren't that impactful. The outcomes that most of us care about—obesity, diabetes, heart disease, cancer—involve dozens of genes interacting in ways we don't yet understand. Genes can also be turned on and off. They do different things at different times of life and in different parts of the body. So how much does a single gene contribute to a person's developing one of these conditions? "Very little," says Cecile Janssens, Ph.D., a professor of epidemiology at Emory University whose research focuses on how genomic studies translate into clinical and public health practice. "It's likely less than 1%."

What's more, experts estimate that, overall, genes only explain about 10% of the risk linked to diet-related diseases like obesity and type 2 diabetes. "It's *Homo sapiens* arrogance to think we can't know what to eat until we're all individually profiled—because we're all so unique and special," says Katz. "There are fundamental truths to feeding humans, just like dolphins should eat fish and pandas should eat bamboo. Ninety percent of health is a diet that applies to *everyone*. Someday we'll be able to use personalized nutrition to ice the cake. But the cake itself is just a generally healthy diet." In other words, your body doesn't demand a perfect diet, just a good one.

What we will be able to do with all the spectacular nutrigenetic data we're going to acquire is use it to make better diagnoses of diseases and recommendations for dietary changes that *do* really matter. Kohlmeier gives a great hypothetical example: A 51-year-old man has an enlarged liver. He is overweight, has stopped drinking alcohol, and his cholesterol is under control, thanks in part to a diet low in eggs, meat and saturated fat and high in fruits, vegetables and whole grains—still, his condition is getting worse. The textbook medical approach would call for weight loss and exercise. But a DNA test his physician gave him shows that the patient has a gene variant that means his body doesn't synthesize choline well—and he's eliminated perhaps half his intake of this nutrient by eating less meat and eggs. Not getting enough choline can cause fatty liver disease. The dietary Rx: get more choline from food or a supplement.

You'll notice that this isn't the kind of nutrition wisdom you'd expect to get from a website or app. And that's probably going to be true of much of the nutrigenetic advice we receive in the near term. It's going to sensitize physicians to the range of variations they should expect to see in their patients, and it's going to provide a way to connect the dots between symptoms, genes, diet and factors like physical activity and environment. Ultimately, this knowledge could provide the basis for deeply informed health coaching.

Actually, there's already a prototype of what that kind of coaching could look like. A few years back, a team led by Leroy Hood, M.D., Ph.D., a super-important figure in the history of genome sequencing, started Arivale, a company aimed at developing an extremely detailed picture of what is going on in the body and using it to deliver health strategies to customers via skilled coaches. They looked at DNA—not just a few genes, but the whole shebang—then did repeated tests of pretty much anything you've ever heard of and more, like blood pressure, cholesterol, height, weight, waist circumference, cortisol levels, microbiome, proteins that affect heart and brain function, and metabolites (the end products of chemical reactions in your body—sugars, lipids, amino acids, fatty acids and the like). Then they threw in a whole lot of computing power to make sense of it all and provided clients with personalized diet and lifestyle plans to improve health outcomes.

The results, by all accounts, were impressive. People who stuck with the program saw their cholesterol, triglycerides, waist diameter and hemoglobin A1C all move in the right direction—enough to have a substantial impact on health. And because Arivale continually analyzed its own data, looking for new connections between genetics and health, it was likely to get even better.

I say "was" because Arivale went out of business this past spring. The problem, according to co-founder Nathan Price, Ph.D., associate director of the Institute for Systems Biology, which developed the concept: "The economics just didn't work out. Basically the program's too expensive for what people can pay." That was still true even after Arivale cut its subscription price from about $3,500 a year to $99 a month.

Not to worry. Arivale or something similar will be back. They've figured out the hard part—how to better people's health based on DNA. Now they just have to figure out how to pay for it, and costs are coming down all the time. Give it a few years.

In the meantime, eat your vegetables, watch your saturated fat, stay active and have a little faith in the ongoing ingenuity of the human race. Despite occasional glitches, we're not so dumb.

I mean, we invented the salad fork.

PATRICK CLINTON *is an Ann Arbor, Michigan-based journalist, educator and master science distiller. He has covered food, health, medicine and the bizarre world of food law and regulation for a variety of publications.*

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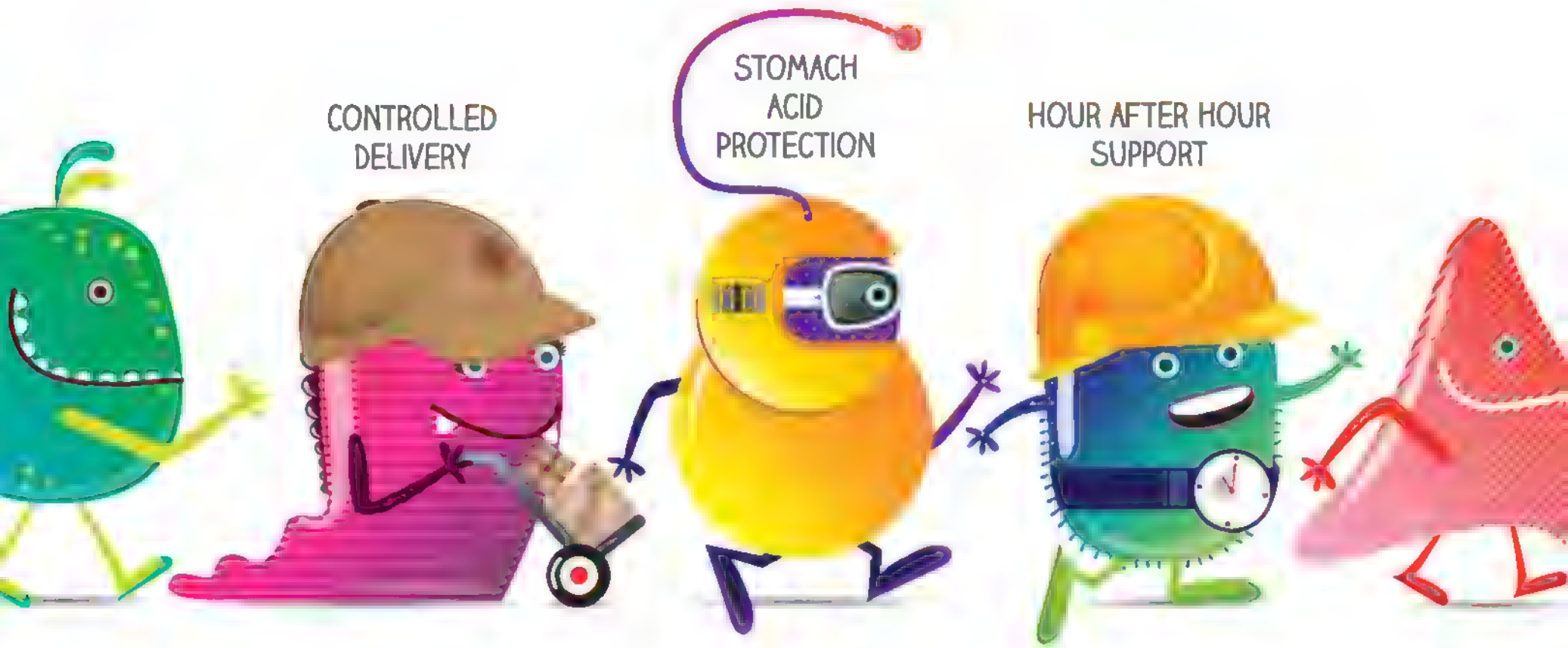

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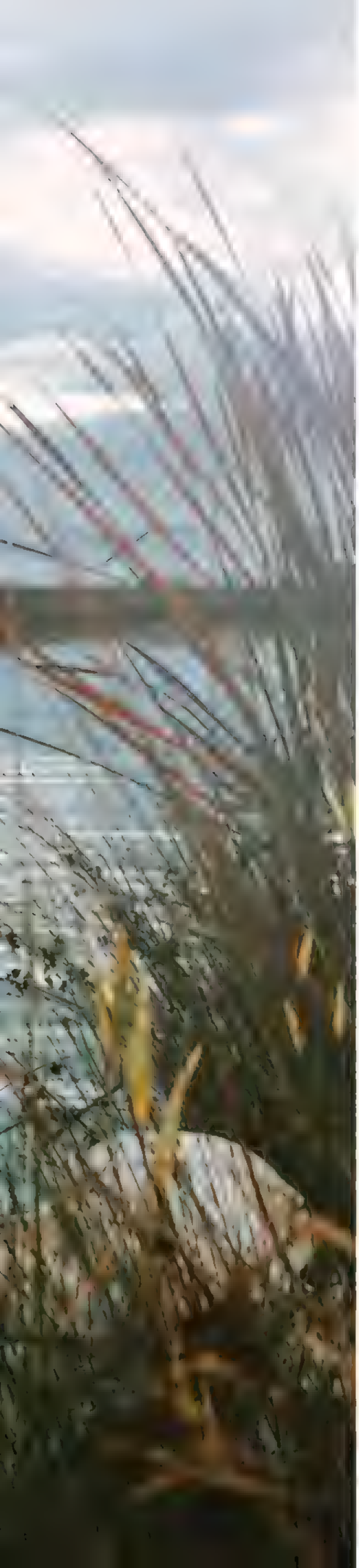
NON GMO VEGETARIAN GLUTEN AND PRESERVATIVE FREE

AMERICAN HEALTH

California has lost as much as 90% of its wetlands, areas that improve water quality and provide essential habitats. The lakes Michael Passmore *(shown here)* dug on his fish farm not only hold sturgeon and other fish, they are home to a wide range of plants and wildlife, including nesting osprey and eagles.



Fish for the Next Generation

AQUACULTURE

As wild populations falter, aquaculture will be essential if we want to eat seafood in the decades to come. So it's more important than ever to find ways to do it like Michael Passmore does—better, cleaner and more efficiently. **By Carolyn Jung**

LOCATION PHOTOGRAPHY
BY MARC OLIVIER LEBLANC

The dust settles as Michael Passmore brakes to a stop on a dirt road that cuts through his 84-acre fish ranch on the edge of Northern California's Sierra foothills. He bounds over to an aboveground pool where 50 sturgeon swim, each about 6 feet long and 100 pounds. The fish are part of Passmore Ranch's brood stock—mature fish used for breeding. After inspecting them, he steps into a corrugated steel gazebo that encloses a hatchery. Baby fish 2 inches long shimmy in tubs of recirculating water. When they get bigger Passmore will transfer them to one of seven 6-foot-deep lakes he dug that dot his property. The fish will remain there until they reach market size and are sold to some of the finest restaurants in the country.

In 2005, Passmore couldn't find a single loan to develop the farm. After all, he had no farming experience. But that didn't stop the now-47-year-old former Marine. Through a decade of scorching summers and dank winters, he and his wife lived on the property in an RV as he built infrastructure, installed electricity and moved 300,000 cubic yards of dirt. "In the beginning, I hauled our water in, we ran a generator a few hours a day, and I hauled our septic out," Passmore says. "It was not for the faint of heart."

Humans consumed an estimated 333 billion pounds of fish in 2016, according to a United Nations report. And each year that amount is increasing, at an even faster rate than the population is growing. Meanwhile the global catch of wild seafood has stayed relatively flat since the 1980s. This is in large part due to the fact that over a third of wild fish populations are overfished and more than half are fished at their maximum sustainable level. Seafood raised on farms, aka aquaculture, is filling the gap between the increasing demand and the limited supply of wild fish. And aquaculture is set to be our largest source of seafood in 2020. *(See "Where the World's Fish Comes From," page 103.)*

But there's an ugly side of aquaculture—questionable practices have led to problems like coastal habitat destruction, polluted waterways and unwanted escaped species. *(See "Aquaculture: 3 Ways," page 98, for more on different methods of farming seafood.)* But the industry is making considerable strides. "There are now good examples for most farmed species out there," says Ryan Bigelow, senior program manager for the Monterey Bay Aquarium's Seafood Watch program.

Passmore Ranch is one such model of a better way to cultivate fish. Sturgeon, catfish and carp are raised in its landlocked lakes and tanks, eliminating the risk of escapees invading other bodies of water. A water-treatment system removes waste (mostly uneaten food and fish feces) and allows the water to be used up to seven times. "Our goal is to utilize each drop of water as many times as possible," Passmore says. And, perhaps most important,

the ranch's feed is largely plant-based: only 15% of it is fishmeal from scraps left over from processing wild and farmed fish. Usually fishmeal comes from wild fish, typically small species but ones that are essential nonetheless because they form the foundation of the marine food web.

Unfortunately, Passmore's operation is not a universal solution for farming fish sustainably. Take bluefin tuna, one of the most overfished species in the world. Bluefin typically live 15 to 30 years, average 6½ feet long and weigh in at about 550 pounds. Some are farmed in marine net pens, but imagine the scale of an operation needed to raise them in ponds or tanks. Not only that, while Passmore's fish are healthy on their mostly plant-based diet, farm-raised bluefin need an average of 20 pounds of feed, mostly wild fish, to gain just 1 pound.

According to Ethan Lucas, project director for FishWise, a Santa Cruz-based nonprofit that works with businesses to foster marine conservation, Passmore really stands out from the pack. FishWise has partnered with Passmore since 2010 because "They are being innovative and finding ways to produce species that are popular or niche and creating a demand for them," says Lucas. "It is seafood raised with environmental stewardship in mind."

Chefs at more than 400 restaurants across the country, including the likes of Thomas Keller and Alex Guarnaschelli, feature Passmore's fish on their menus. Joey Elenterio, owner of French Fries & Caviar Consulting, is a fan of Passmore's catfish in particular. "Often, we think of catfish as a muddy-tasting fish. His is so clean and distinct. He won me over," Elenterio says. "Ever since I tried it, I've been a believer in Passmore Ranch."

Walking around the farm, it's clear that Passmore is passionate about his operation. He's planning to add a 4,000-square-foot caviar-production facility in the months to come. Eventually, he wants to plant vineyards and orchards and to build an aquaponics system to grow vegetables that will be fertilized by the nutrient-rich water from the fish lakes. "Folks ask me all the time what I'd do if this all went up in flames," Passmore says. "I'd build it all over again."

CAROLYN JUNG *is an award-winning food writer based in the Bay Area.*

RECIPES BY
JOEY ELENTERIO

FOOD PHOTOGRAPHY
BY GREG DUPREE

STYLING: CHELSEA ZIMMER (FOOD), AUDREY DAVIS (PROPS)

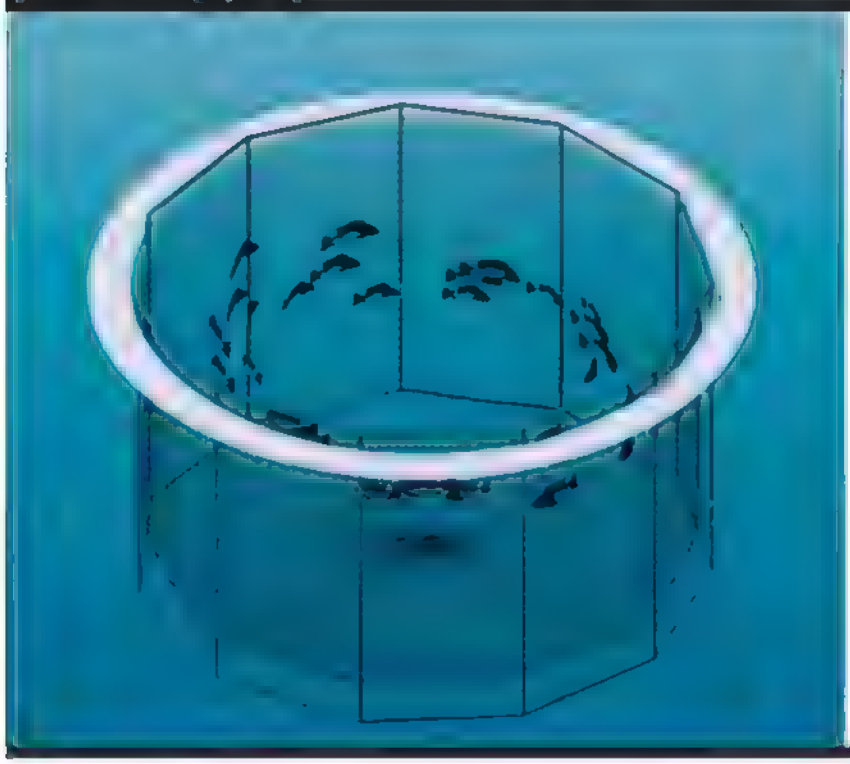
BLACK BASS WITH SAUTÉED VEGETABLES & CIOPPINO JUS *(p.100)*

Distinct salty minerality makes the 2017 Ameztoi 'Rubentis' Getariako Txakolina (Spain, $25) a perfect complement to the cioppino jus.

AQUACULTURE: 3 WAYS

TEXT BY CLARE LESCHIN-HOAR
ILLUSTRATIONS BY JING ZHANG

MARINE PEN



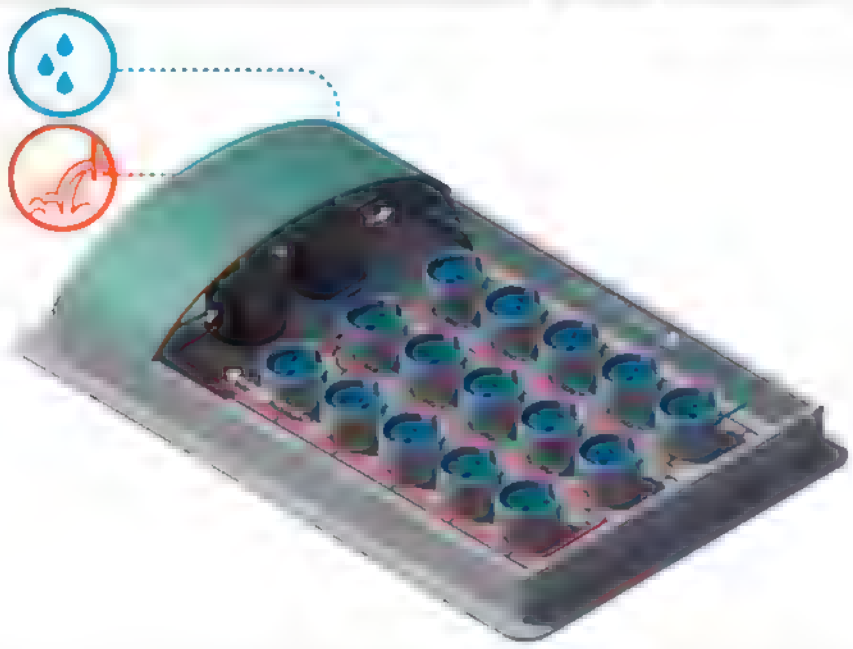
What it is: A cage, usually made of wire or synthetic material like nylon, that corrals fish in the ocean.

Species: Salmon, yellowtail, branzino (European sea bass)

Benefits: New net-pen farms are sited in locations with strong currents and rocky bottoms so waste is more easily dispersed. To combat sea lice—tiny parasites that harm farmed and nearby wild salmon—fish farmers are using small fish called lumpsuckers (which nibble sea lice off salmon), warm-water baths and even lasers. The result: fewer pesticides are needed. And vaccinations, lower stocking densities, fish stocks bred for better disease resistance, and adding probiotics to the fishes' diets have reduced reliance on antibiotics.

Future outlook: Integrated systems might include a marine pen stocked with salmon, surrounded by ropes of mussels and sheets of seaweed, both which can absorb excess nitrogen and phosphorus from fish feed.

TANK SYSTEM



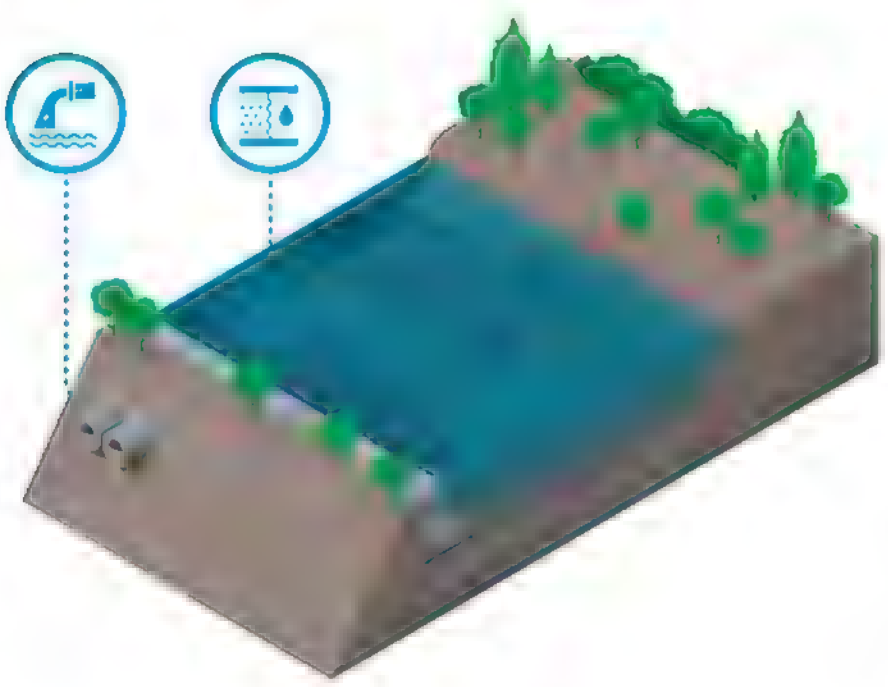
What it is: Connected tanks, typically indoors, with filtered water continuously flowing from one tank to another; also known as a recirculating aquaculture system.

Species: Sturgeon, striped bass, steelhead trout, salmon, yellowtail, turbot, Arctic char, branzino and tilapia

Benefits: Self-containment means fish can't escape, plus pollution and habitat destruction are minimized. As much as 98% of the waste—like uneaten food pellets and fish feces—can be captured. Depending on the type of treatment system, water can be reused up to 1,000 times. Although these systems are energy-intensive, they can be located close to an urban populations so the fish won't have to travel as far to our plates, offsetting some of its carbon footprint.

Future outlook: By 2030, up to 40% of the world's aquaculture products may be grown in tanks.

POND



What it is: A natural or man-made fresh- or saltwater pond.

Species: Shrimp, tilapia, catfish, pangasius, black and striped bass, silver carp and white sturgeon

Benefits: Older ponds were designed to be open to rivers, estuaries or coastal zones for easy access to fresh water. But today's improved ponds use "closed system" designs that prevent both pollution discharges and farm-raised species from escaping. Advances in water filtration remove waste and chemicals (like fertilizers or antibiotics), and recirculating systems allow farmers to reuse water. Adjacent treatment or settlement ponds safely keep waste out of nearby water sources.

Future outlook: Pond aquaculture had been one of the leading causes of coastal mangrove loss. Mangrove trees are important because they trap carbon and reduce flooding and erosion. Countries including Ecuador, India, Indonesia, Thailand and Vietnam have recently enacted stronger laws to protect them from further devastation.

CATFISH WITH SHERRY VINEGAR LENTILS *(p. 100)*

An unoaked Chardonnay like the 2017 A to Z Wineworks Chardonnay (Oregon, $15) lets the green-apple flavor burst through.

Balance the charred onions with a glass of crisp, dry rosé, like the 2017 Commanderie de la Bargemone Coteaux d'Aix en Provence Rosé (France, $15).

Catfish with Sherry Vinegar Lentils

ACTIVE: 35 min **TOTAL:** 45 min
EQUIPMENT: Cheesecloth, kitchen string

Catfish are omnivorous, so they have a lighter environmental impact than farmed species that need to be fed pellets made from other fish. A brush of Dijon mustard and a generous sprinkle of crushed peppercorns temper the subtle earthy flavor this fish is sometimes known for. (Photo: page 99.)

- **2 tablespoons chopped onion plus ¼ cup finely diced, divided**
- **1 tablespoon chopped carrot**
- **1 tablespoon chopped celery**
- **1 clove garlic**
- **1 sprig fresh rosemary**
- **1 sprig fresh thyme**
- **½ teaspoon whole peppercorns**
- **½ bay leaf**
- **3 cups unsalted chicken broth**
- **1 cup French green lentils, rinsed**
- **2 ounces thick-cut bacon, diced (¼-inch)**
- **¼ cup sherry vinegar**
- **2 tablespoons Dijon mustard, divided**
- **4 5-ounce skinned catfish fillets**
- **1½ teaspoons cracked pepper**
- **½ teaspoon kosher salt, divided**
- **1 tablespoon canola *or* avocado oil**
- **¾ cup finely diced Granny Smith apple**
- **1 tablespoon butter**
- **1 tablespoon finely chopped seeded jalapeño**
- **Chopped fresh parsley for garnish**

1. Place chopped onion, carrot, celery, garlic, rosemary, thyme, peppercorns and bay leaf on a double layer of cheesecloth. Bundle up and tie with kitchen string to create a sachet. Gently smash the sachet to release some of the aromas. Combine broth, lentils and the sachet in a medium saucepan. Bring to a boil over high heat. Reduce heat to maintain a simmer; and cook, stirring occasionally, until the lentils are tender, 25 to 30 minutes. Discard the sachet.

2. Meanwhile, cook bacon and the remaining diced onion in a medium skillet over medium-low heat, stirring occasionally, until the bacon is crisp and the onion is tender, 10 to 12 minutes. Stir in vinegar and 1 tablespoon mustard, scraping up any browned bits. Stir in the lentils and cook until heated through, about 2 minutes. Remove from heat and cover to keep warm.

3. Heat a grill pan over high heat. Brush catfish with the remaining 1 tablespoon mustard and sprinkle with cracked pepper and ¼ teaspoon salt. Brush oil over the grill pan. Add the fish and cook until the bottom is browned, about 5 minutes. Turn and cook until the fish just flakes with a fork, 3 to 5 minutes more.

4. Stir apple, butter, jalapeño and the remaining ¼ teaspoon salt into the lentil mixture. Serve the fish on the lentils, garnished with parsley, if desired.

SERVES 4: 4 oz. fish & ¾ cup lentils each
CAL 406 / **FAT** 14G (SAT 4G) / **CHOL** 91MG / **CARBS** 33G **TOTAL SUGARS** 4G (ADDED 0G) / **PROTEIN** 36G **FIBER** 8G / **SODIUM** 657MG / **POTASSIUM** 994MG.

Baked Salmon with Charred Onions & Old Bay Radishes

ACTIVE: 30 min **TOTAL:** 45 min

While farmed salmon historically has gotten a bad rap, many options now rate as Best Choice and Good Alternative by Monterey Bay Aquarium's Seafood Watch program. Use wild Pacific salmon if you prefer (most comes from well-managed fisheries), but check for doneness a few minutes early as it's typically leaner. The charred onion puree is both smoky and sweet, a nice foil for the simple salmon.

- **2 medium onions, sliced ½ inch thick**
- **4 tablespoons extra-virgin olive oil, divided**
- **Zest of 2 lemons**
- **1½ teaspoons cracked pepper**
- **1 teaspoon kosher salt, divided**
- **4 5-ounce skin-on salmon fillets**
- **6 large radishes, cut into wedges, plus more thinly sliced for garnish**
- **1 teaspoon Old Bay Seasoning**
- **½ teaspoon sugar**
- **Fresh cilantro & flaky sea salt for garnish**

1. Preheat oven to 325°F.

2. Heat a large cast-iron skillet over high heat. Add onions and cook, pressing down occasionally, until completely charred on one side, 10 to 15 minutes. Turn and cook, pressing down occasionally, until charred on the second side, 8 to 10 minutes more. Transfer to a large bowl and cover tightly. Let steam for 15 minutes.

3. Meanwhile, mix 2 tablespoons oil, lemon zest, pepper and ½ teaspoon salt in a small bowl. Add 1 tablespoon oil to a medium ovenproof nonstick or cast-iron skillet and add salmon, skin-side down. Spread the lemon zest mixture on the salmon. Bake until just cooked through, 14 to 16 minutes.

4. Bring a small saucepan of water to a boil. Add radish wedges and cook until just tender, 5 to 6 minutes. Drain and pat dry. Dry the pan and add the remaining 1 tablespoon oil and Old Bay. Heat over medium heat until sizzling, about 1 minute. Remove from heat and stir in the radish wedges. Cover and keep warm.

5. Combine the onions, the remaining ½ teaspoon salt and sugar in a food processor; puree until smooth.

6. Serve the salmon with the onion puree and radishes. Garnish with sliced radishes, cilantro and flaky salt, if desired.

SERVES 4: 4 oz. salmon, 2 Tbsp. onion puree & ¼ cup radishes each
CAL 324 / **FAT** 19G (SAT 3G) / **CHOL** 66MG / **CARBS** 7G **TOTAL SUGARS** 3G (ADDED 1G) / **PROTEIN** 29G **FIBER** 2G / **SODIUM** 718MG / **POTASSIUM** 653MG.

Black Bass with Sautéed Vegetables & Cioppino Jus

ACTIVE: 1 hr **TOTAL:** 2½ hrs
TO MAKE AHEAD: Refrigerate jus (Steps 1-5) for up to 1 day or freeze for up to 1 month.

Black bass has a delicate flavor that begs to be paired with something bold, like this cioppino-inspired jus. The jus takes some time to make but we promise it's worth it. You'll have some left over: do as our editor-in-chief did and try it as a bloody mary base. Or use it to make risotto or a seafood stew. (Photo: page 97.)

BAKED SALMON WITH CHARRED ONIONS & OLD BAY RADISHES

- **1 pound unpeeled, head-on raw shrimp**
- **4 tablespoons canola oil, divided**
- **⅓ cup chopped onion**
- **3 cloves garlic, smashed**
- **1 cup chopped fennel**
- **½ cup chopped carrot**
- **½ cup chopped celery**
- **⅓ cup tomato paste**
- **½ cup Pernod *or* other pastis plus 2 tablespoons, divided**
- **8 cups water**
- **1 bay leaf**
- **2 sprigs fresh thyme**
- **1 teaspoon crushed red pepper**
- **1 teaspoon whole peppercorns**
- **¾ teaspoon kosher salt, divided**
- **1 medium yellow squash, diced**
- **1 medium zucchini, diced**
- **15 cherry tomatoes, halved**
- **2 tablespoons butter, divided**
- **1 teaspoon ground pepper**
- **4 5-ounce skin-on black bass *or* cod fillets**
- **Chopped fennel fronds, fresh tarragon, lemon zest & fennel pollen for garnish**

1. Preheat oven to 350°F. Coat a 9-by-13-inch baking pan with cooking spray.

2. Twist heads off shrimp and place the heads in the prepared pan. Pull off and discard legs. Peel and devein the shrimp; set the shrimp aside in the refrigerator and add the shells to the pan. Roast the heads and shells until pink and crispy, about 15 minutes.

3. Meanwhile, heat 1½ tablespoons oil in a large pot over medium-low heat. Add onion and garlic and cook, stirring occasionally, until translucent, about 5 minutes. Add fennel, carrot and celery and cook, stirring occasionally, until softened, about 8 minutes. Add tomato paste and cook, stirring, until fragrant, about 1 minute. Add ½ cup Pernod (or other pastis) and cook, stirring, until the liquid has evaporated, about 1 minute.

4. Add water, bay leaf, thyme, crushed red pepper, peppercorns, the roasted heads and shells and the reserved shrimp. Bring to a boil over high heat. Reduce heat to maintain a lively simmer and cook, stirring occasionally, until reduced to 6 cups, 1 to 1½ hours.

5. Discard the bay leaf. Transfer the mixture to a blender in batches and blend until smooth (be careful when blending hot liquids). Pour

through a fine-mesh sieve into a large saucepan, pressing on the solids to get as much liquid as possible. (You should have about 4 cups of cioppino jus.) Season with ½ teaspoon salt. Cover to keep warm.

6. Heat 1½ tablespoons oil in a large skillet over medium heat. Add squash and zucchini and cook, stirring occasionally, until starting to brown, 10 to 12 minutes. Stir in tomatoes, then the remaining 2 tablespoons Pernod (or other pastis), scraping up any browned bits. Stir in 1 tablespoon butter and pepper. Cover to keep warm.

7. Pat fish dry with paper towels and sprinkle with the remaining ¼ teaspoon salt. Heat the remaining 1 tablespoon oil in a large nonstick skillet over medium-high heat. Add the fish, skin-side down. Cook, pressing gently with a spatula, until the skin is crispy, about 5 minutes. Turn the fish and add the remaining 1 tablespoon butter. Cook, basting with the butter, until the fish is just cooked through, 3 to 5 minutes more.

8. Divide the vegetables among 4 shallow bowls and top each with a piece of fish. Pour ¼ cup cioppino jus around the vegetables. (Reserve the remaining jus for another use.) Garnish with fennel fronds, tarragon, lemon zest and fennel pollen, if desired.

SERVES 4: 4 oz. fish, ½ cup vegetables & ¼ cup jus each

CAL 475 / **FAT** 18G (SAT 5G) / **CHOL** 117MG / **CARBS** 15G **TOTAL SUGARS** 11G (ADDED 0G) / **PROTEIN** 35G **FIBER** 3G / **SODIUM** 614MG / **POTASSIUM** 973MG.

FARM SCHOOLED

Follow these tips so your dinner doesn't harm the ocean.

BY RACHEL STEARNS

Check the App Search by species on the Seafood Watch app, then drill down to find its rating based on various factors including farming practices.

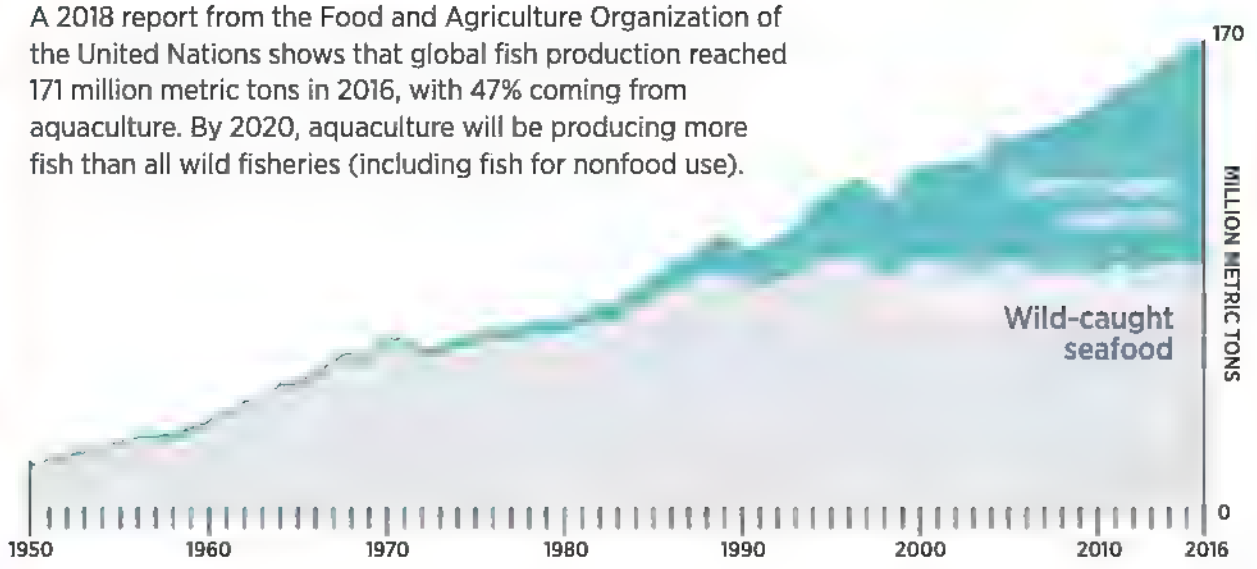
When in Doubt, Eat These

Oysters, clams, scallops and mussels are almost always farmed sustainably plus they filter water, making it cleaner. Other best bets include U.S.-raised rainbow trout and catfish as well as arctic char from around the globe.

Look for These Labels:

Where the World's Fish Comes From

A 2018 report from the Food and Agriculture Organization of the United Nations shows that global fish production reached 171 million metric tons in 2016, with 47% coming from aquaculture. By 2020, aquaculture will be producing more fish than all wild fisheries (including fish for nonfood use).



Steelhead Trout with Creamy Barley & Herb Salad

ACTIVE: 45 min **TOTAL:** 1¼ hrs
EQUIPMENT: Cheesecloth, kitchen string

Steelhead and rainbow trout are the same species, but steelhead are anadromous, meaning that, like salmon, they migrate from the ocean to freshwater to spawn. Salmon and arctic char are a good substitute if you have trouble finding steelhead. The creamy barley the fish is served with has a texture similar to risotto, and toasting the grains before cooking gives the dish a nutty flavor. A knob of fresh horseradish is worth seeking out for this; its flavor is more nuanced than jarred.

- **2 tablespoons chopped leek plus ⅔ cup finely diced leek top, divided**
- **1 tablespoon chopped carrot plus ½ cup finely diced, divided**
- **1 tablespoon chopped celery**
- **2 cloves garlic, crushed, divided**
- **1 fresh parsley stem plus ½ cup parsley leaves, divided**
- **⅛ bay leaf plus 1 whole bay leaf, divided**
- **⅛ teaspoon whole peppercorns**
- **5 tablespoons extra-virgin olive oil, divided**
- **1 cup pearl barley**
- **4 cups water**
- **4 cups unsalted chicken broth**
- **½ lemon**
- **½ cinnamon stick**
- **½ cup finely diced peeled turnip**
- **2 tablespoons butter, divided**
- **2 tablespoons sliced fresh chives plus 1 cup 1½-inch pieces**
- **2 tablespoons grated peeled fresh horseradish**
- **1 teaspoon kosher salt, divided**
- **4 5-ounce skinned steelhead trout fillets**
- **1½ teaspoons cracked pepper**
- **2 sprigs fresh thyme**
- **2 tablespoons fresh tarragon leaves**
- **1 tablespoon fresh chervil leaves**

1. Place chopped leek, chopped carrot, celery, 1 garlic clove, parsley stem, ⅛ bay leaf and peppercorns on a double layer of cheesecloth. Bundle up and tie with kitchen string to create a sachet. Gently smash the sachet to release some of the aromas. Heat 2 tablespoons oil in a medium saucepan over medium heat. Add barley and cook, stirring, until toasted, 1 to 3 minutes. Add water and the sachet. Bring to a boil over high heat. Reduce to a simmer and cook, stirring occasionally, until the water is mostly absorbed and the barley is tender and creamy, 35 to 40 minutes. Discard the sachet.

2. Meanwhile, combine broth, lemon, cinnamon stick and the remaining whole bay leaf in a medium saucepan. Bring to a boil. Reduce heat to maintain a lively simmer and cook until reduced to 2½ cups, 20 to 25 minutes. Strain (discard solids). Cover to keep warm.

3. Heat 1 tablespoon oil in a large nonstick skillet. Add turnip and the remaining diced leek top and carrot; cook, stirring, until just tender, about 1 minute. Stir the vegetables into the barley along with 1 tablespoon butter, sliced chives, horseradish and ½ teaspoon salt. Cover to keep warm. Wipe out the skillet.

4. Sprinkle trout with cracked pepper and the remaining ½ teaspoon salt. Heat 1½ tablespoons oil in the skillet over medium-low heat. Add the trout and cook for 8 minutes. Turn the trout and add the remaining 1 tablespoon butter, 1 garlic clove and thyme. Cook, basting once or twice with the butter mixture, until the fish flakes with a fork, about 6 minutes more.

5. To serve, combine the remaining parsley leaves, chive pieces, tarragon and chervil in a small bowl. Divide the barley among 4 bowls. Top each with a piece of trout and some of the herbs. Pour ⅔ cup of the warm broth around the barley. Sprinkle with more herbs and drizzle with the remaining ½ tablespoon oil.

SERVES 4: 4 oz. fish, 1 cup barley, ⅔ cup broth & ½ cup herbs each
CAL 646 / **FAT** 33G (SAT 8G) / **CHOL** 96MG
CARBS 48G / **TOTAL SUGARS** 4G (ADDED 0G)
PROTEIN 39G / **FIBER** 10G / **SODIUM** 752MG
POTASSIUM 1,020MG.

FUTURE *of* FOOD

Down on the Smart Farm

PRECISION AGRICULTURE

Berry-picking robots. Tablet-controlled tractors. Weed-sensing drones. How farms are going high-tech to produce more food and a healthier environment.
By Michael Behar

PHOTOGRAPH BY NAYAN STHANKIYA

Trevor Scherman *(right)* has nine weather stations like this one on his farm. They send all sorts of data—rainfall, temperature, humidity, wind and weather forecasts—straight to his iPad. "Weather is such a huge factor in farming," he says. "This way, I'm not just guessing."

Trevor Scherman is getting more rest these days, thanks to his iPad. Scherman is a farmer who grows wheat, peas, canola and lentils near Battleford, Saskatchewan. Like legions of farmers in both Canada and the United States, he uses precision agriculture technology—cutting-edge tools like drones and satellite imagery—to keep a careful watch on his crops. The sensors positioned around Scherman's farm provide instant feedback on all sorts of conditions that could impact his crops, such as heavy rain or a sudden frost. He also gets digital satellite images of his fields delivered by email. A company called Farmers Edge analyzes the data with sophisticated mathematical algorithms and artificial intelligence (AI). In addition to identifying major issues, the software can even pinpoint a minor weed outbreak or a few acres where plants are withering, problems that large-scale farmers like Scherman likely would have never discovered on their own until they were rampant.

THIS TECHNOLOGY CAN REDUCE THE APPLICATION OF PESTICIDES AND OTHER CHEMICALS BY UP TO 80%, SHRINK WATER USAGE BY BETWEEN 20% AND 50% AND BURN 40% LESS FUEL.

Not only has precision ag made Scherman's 6,500-acre farm more efficient and profitable, he also no longer has to get up at 3 a.m. when it rains and spend hours driving around his property in the predawn darkness to assess soil conditions so he knows whether or not to seed. (If the ground is too soggy, the seeds won't germinate.) Scherman used to have to check his rain gauges manually, but now a network of wireless sensors continuously monitors precipitation, transmitting the readings to an app on his iPad, which he checks in bed. "If it's too wet," he says, "I go back to sleep."

Because farmers equipped with precision ag know exactly where problems exist, they can also use less water and limit their application of pesticides, herbicides, fungicides and fertilizers to the plants that need them most, subsequently reducing their reliance on these chemicals. And it translates to less time and mileage crisscrossing fields in a diesel-fueled tractor that's spewing carbon emissions from its tailpipe. A recent USDA report estimates that this technology can reduce the application of pesticides and other chemicals by up to 80%, shrink water usage by between 20% and 50% and burn 40% less fuel. Precision ag also reduces crop losses by up to 80%, in part by locating weed-infested areas or diseased plants with 99% accuracy.

"If farmers don't catch problems in time, they can lose crops. And margins are tight, so one wrong decision can significantly impact their bottom line," says Marina Barnes, chief marketing officer for Farmers Edge. With so many farmers adopting the technology (according to a 2017 survey, up to 93% of farms larger than 1,000 acres are using some form of precision ag) it's also a big win for the environment. Smaller operations—including organic farms—have begun turning to precision ag, too, to keep an eye on weather patterns, weeds and yield. And farmers report a real benefit to using these practices. "I have seen an increase year over year for my return on investment," says Scherman. Turn the page for more ways tech is already shaping the future of farming.

GROWING TECHNOLOGY

Take a look at the innovations that growers, dairy farmers and ranchers are using to be more productive and lighten their environmental footprint. This future is now; imagine what cool gadgetry we'll dream up next.

ILLUSTRATION BY JING ZHANG

Robotics Robots are the newest technology to debut in precision ag, though many designs are still being tested or prototyped. Even so, they're slowly replacing humans on farms that cultivate labor-intensive crops, especially those that require a delicate touch, such as strawberries and grapes. There are currently huge labor shortages on American farms, and robots could mean the difference between a farmer's produce being picked or going to waste in the fields. (A) Harvest CROO Robotics, a tech company in Tampa, Florida, is engineering what will be perhaps the most advanced agricultural system available. Its strawberry picker, named "Berry 5," is about the size of a school bus and has taken five years and $10 million to develop. On its underside are 16 robotic pickers, each with a camera that snaps 400 images per second. Special processing software then determines whether the berries are ripe. The robotic pickers can pluck the fruits from a single plant in just 10 seconds—allowing the machine to selectively harvest 8 acres a day, a feat that would take about 30 human workers to accomplish.

On dairy farms, robots are also being used to milk cows and increase production. (B) The cows enter special stalls that dispense just the right amount of food for them to nibble on while they're being milked. The equipment is also designed to sanitize before each milking, and if something goes awry, it sends text alerts to the farmer. Automated milkers can check the health of the cow's udder and other measures of well-being, too.

GPS A constellation of 32 orbiting satellites forms the Global Positioning System (GPS), a location-tracking technology that tells Uber how to find you and navigates airplanes, among countless other tasks. In the mid-1990s, GPS ignited the precision ag movement when farm equipment manufacturers began installing it on tractors to automate steering and navigation. Today, GPS-guided equipment like tractors and combines (C) is nearly ubiquitous in agriculture. It helps farmers avoid overlap—so they don't seed, spray pesticides and fertilizers or water an area twice, which often leads to excessive waste and environmental harm. And thanks to self-driving machinery (D), farmers can work in dense fog or at night, when visibility is limited but winds are typically lighter, reducing pesticide drift and overseeding.

Drones Unmanned aerial vehicles, aka drones (E), furnish farmers with an immediate, up-close view of their fields. Drones are relatively inexpensive, self-operational (with many, a trained farmer can preprogram a flight plan through a tablet and the drone pilots itself) and easy to outfit with a variety of sensors, cameras and hardware that tell the farmer just about anything he or she wants to know. There are sensors that measure chlorophyll, pertinent to a plant's overall health and vigor. Other drone-mounted cameras use color-sensitive filters—multispectral, hyperspectral and thermal—that act like bionic eyes in the sky. They can "see" ground temperature, assess the water content in the soil, tally the number of plants within a specified area, confirm seeds are germinating, estimate crop yields and spot weed outbreaks. Drones are also used on livestock and dairy farms to monitor and herd the animals (F) and track any that get lost.

Weather Forecasting Your local weather forecast helps you decide if you should carry an umbrella to work. But its predictions are too generalized for farmers, who need extreme specificity. For that, they look to companies like the Climate Corporation, aWhere or Aeris to craft customized hyperlocal forecasts (G) that can tell them—down to a mile or two—if it'll be too windy to fertilize or too wet to plant. Urgent warnings for hail, lightning or frost arrive via text alerts. Meanwhile, on-farm weather stations dispatch real-time conditions and record historical data. This came in handy when a hard freeze destroyed Scherman's recently germinated crop of

canola. Although he had insurance, the adjuster wouldn't cover the loss because the nearest official weather station never recorded subfreezing temperatures. "But that was 30 miles away," he says. "I had them come out and see my weather stations; I had data that proved it froze on my farm." The insurer promptly paid up, enabling Scherman to buy new seed and replant quickly before he missed the brief springtime window.

Satellite Imagery It can take several years and thousands of orbits for a conventional satellite to survey our entire planet. Now more than a dozen companies are operating fleets of tiny, shoebox-size satellites called "CubeSats" that produce daily satellite imagery in unprecedented detail. For example, Planet, based in San Francisco, currently has more than 150 CubeSats in orbit—enough to capture every square inch of Earth in a single day. Its satellites snap thousands of high-definition images, often employing a NASA-developed remote-sensing technology called Wide Dynamic Range Vegetation Index, which can distinguish between different plant species and convey their health status. Software scans the images for anomalies, like drooping crops or plants darkening in color (perhaps from a nutrient deficiency or drainage issue). Says Scherman: "I use it to track pests, like beetles." From the ground, farmers might not notice the problem until rows of crops are damaged or destroyed.

MICHAEL BEHAR *is a Boulder, Colorado-based science, technology and health writer.*

This article was produced in collaboration with the Food & Environmental Reporting Network, a nonprofit investigative news organization.

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MORSELS

YOUR EVERYTHING GUIDE TO

Pumpkins

25 Fun Facts, Products, Tips & Recipes (including pumpkin spice latte cookies!)

By Lucy M. Casale
Recipes by the EatingWell Test Kitchen

CAMERON ZEGERS/STOCKSY

FAMILY FEED

Bake Some PSL Cookies

Instant espresso powder gives these soft, cakey cookies a subtle yet recognizable coffee flavor. Dust with cinnamon to finish.

Pumpkin Spice Latte Cookies

ACTIVE: 55 min **TOTAL:** 1¼ hrs
TO MAKE AHEAD: Refrigerate for up to 3 days.
EQUIPMENT: Parchment paper

- **3 cups white whole-wheat flour**
- **1 teaspoon baking powder**
- **1 teaspoon baking soda**
- **1 teaspoon salt**
- **2 large eggs**
- **1 15-ounce can unseasoned pumpkin puree**
- **2 cups light brown sugar**
- **1 cup grapeseed *or* canola oil**
- **3 tablespoons milk, divided**
- **1 tablespoon pumpkin pie spice plus 1 teaspoon, divided**
- **3 teaspoons instant espresso powder, divided**
- **1 teaspoon vanilla extract**
- **8 ounces reduced-fat cream cheese, softened**
- **4 tablespoons (½ stick) butter, softened**
- **1 cup confectioners' sugar**

1. Preheat oven to 375°F. Line 2 baking sheets with parchment paper.
2. Whisk flour, baking powder, baking soda and salt in a medium bowl.
3. Beat eggs, pumpkin, brown sugar and oil in a stand mixer or with an electric hand mixer until well combined, about 1 minute. Add 2 tablespoons milk, 1 tablespoon pumpkin pie spice, 2 teaspoons espresso powder and vanilla and beat until well combined, about 1 minute. Add the flour mixture in 3 parts, mixing until just combined after each addition.
4. Using 2 tablespoons per cookie, drop mounds of the dough onto the prepared pans, at least 2 inches apart. Bake the cookies until firm and dry to the touch, 12 to 14 minutes. Let cool on the pans for 5 minutes, then transfer to a wire rack to cool completely, about 20 minutes. Repeat with the remaining dough.
5. Beat cream cheese, butter and confectioners' sugar in a stand mixer or with an electric hand mixer until very smooth, about 2 minutes. Add the remaining 1 tablespoon milk and 1 teaspoon each pumpkin pie spice and espresso powder in a small bowl; beat until combined, about 30 seconds. Spread the frosting on the cookies.

MAKES: about 50 cookies (1 per serving)
CAL 127 / **FAT** 7G (SAT 2G) / **CHOL** 13MG / **CARBS** 16G / **TOTAL SUGARS** 11G (ADDED 10G) / **PROTEIN** 2G / **FIBER** 1G / **SODIUM** 101MG / **POTASSIUM** 42MG.

→ Go to *eatingwell.com/FamilyFeed* for more kid-friendly recipes!

PICK THE RIGHT SQUASH

Pie vs. Carving

Yes, the 10- to 20-pound jack-o'-lanterns sitting on your front porch are edible, but trust us, the squirrels can have them post-Halloween. Carving pumpkins are stringy and bland when cooked. To find ones fit for eating, look for smaller "sugar" or "pie" pumpkin varieties. They weigh 4 to 8 pounds, and are sweet and flavorful with smooth-textured flesh. Our favorite breeds include Autumn Gold, Baby Pam and Long Island Cheese Pumpkin *(shown)*.

SHORT ON TIME?

Buy This!

We taste-tested nearly a dozen brands of puree. One-Pie Pumpkin was the winner for its smooth and creamy consistency and deep squash flavor—just what we want in our fall baked goods.

ROAST PUMPKIN SEEDS

You can always roast clean and dry pumpkin seeds with oil and a little salt. But for amped-up flavor, try one of these irresistible combos. Roast on a baking sheet at 300°F for 40 minutes to 1 hour, stirring occasionally. For complete recipes, go to *eatingwell.com/pumpkinseeds*.

5.
Extra-virgin olive oil + za'atar spice + salt

6.
Canola oil + maple syrup + cardamom + cinnamon + salt

7.
Coconut oil + cocoa powder + sugar + salt

8.
Extra-virgin olive oil + nutritional yeast + onion powder + salt

9.
Extra-virgin olive oil + Old Bay + salt

10.
Extra-virgin olive oil + oregano + smoked paprika + salt

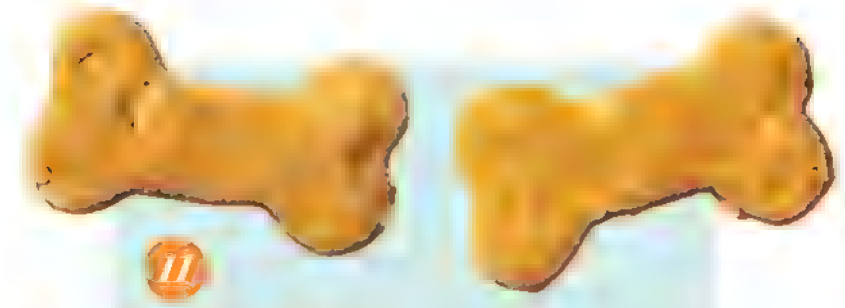
SPARE MINUTES?

Make Pumpkin Puree

It's easier than you think. Plus you can do a big batch and freeze some for later use in our cookies *(opposite)* and dog biscuits *(page 112)*.

To make 4 cups puree: Preheat oven to 400°F. Line a baking sheet with parchment paper. Cut **1 medium pie *or* sugar pumpkin** (about 5 lb.) in half through the stem end. Remove seeds. Bake halves on the prepared pan, flesh-side down, until a fork easily pierces the thickest part, about 45 minutes. Let cool to room temperature, about 1 hour. Scoop pumpkin flesh into a food processor, working in batches as needed. Puree until smooth. If your puree is watery, place the pumpkin mash in a fine-mesh strainer lined with cheesecloth and let stand for 30 minutes to drain off excess liquid. Refrigerate for up to 1 week or freeze for up to 3 months.

COOKIES, SEEDS: BRIE PASSANO; STYLING: KELSEY BULAT (FOOD), SUE MITCHELL (PROPS). PUMPKIN: VEZZANI PHOTOGRAPHY/SHUTTERSTOCK. CANS: CAITLIN BENSEL

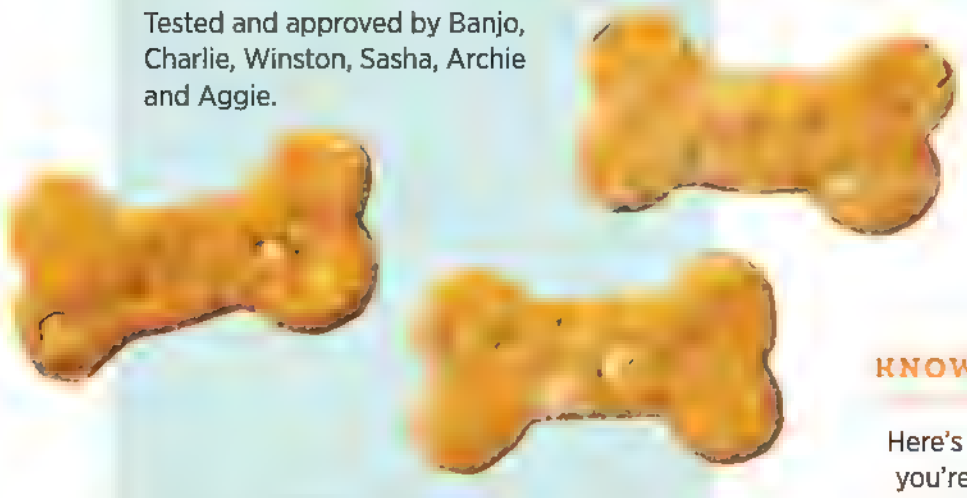


11

DIY DOG BISCUITS

Treat Your Pup!

Tested and approved by Banjo, Charlie, Winston, Sasha, Archie and Aggie.



Peanut Butter-Pumpkin Dog Biscuits

ACTIVE: 30 min **TOTAL:** 45 min
TO MAKE AHEAD: Store at room temperature for up to 1 week or freeze for up to 3 months.
EQUIPMENT: Parchment paper, 4-inch dog-bone cookie cutters

- **2 large eggs**
- **1 cup unsalted natural crunchy peanut butter**
- **½ cup unseasoned pumpkin puree**
- **½ cup water**
- **2 cups whole-wheat flour**
- **1 teaspoon ground cinnamon**
- **½ teaspoon ground ginger**
- **Pinch of salt**

1. Position racks in upper and lower thirds of oven; preheat to 350°F. Line 2 baking sheets with parchment paper.
2. Whisk eggs, peanut butter, pumpkin and water in a large bowl. Add flour, cinnamon, ginger and salt; stir to combine. Transfer to a lightly floured surface and knead until the dough comes together, about 1 minute.
3. Divide the dough into 4 equal portions and lightly dust both sides with flour. Roll one piece of dough into an 8-inch circle about ¼ inch thick, dusting with more flour as necessary to keep it from sticking. Cut out biscuits with a 4-inch dog bone cookie cutter. Transfer to a prepared pan, spacing about ½ inch apart. Shape all the scraps back into a disk and reroll. Continue to cut biscuits until no dough remains.
4. Bake the biscuits until the edges are golden brown, about 15 minutes. Let cool on the pan for 5 minutes, then transfer to a wire rack to cool completely. Repeat with the remaining dough.
MAKES: about 35 biscuits
NUTRITION INFO: Page 114

Reap the Health Benefits Pumpkins get their orange glow from carotenoids, compounds including beta carotene and lutein that bring serious nutrition to the table. Beta carotene, for example, may help keep your brain sharp and is associated with lower rates of Alzheimer's disease. Lutein promotes eye health and is linked to a reduced risk of type 2 diabetes and certain cancers. And get this: pumpkins contain even more carotenoids than carrots.

Grow Your Own Gourds Next Year We recommend saving seeds from heirloom pumpkins (bought from a farmer who can confirm). Heirlooms are "true to seed," meaning if you save their seeds you'll get a similar-looking pumpkin to the one you started with. (There's no easy way to tell with store-bought ones.) Spread clean, dry seeds on a baking sheet lined with parchment, not letting them touch each other. Set in a cool place, turning several times the first couple of days, so they dry evenly on each side. After 3 to 4 weeks, store seeds in an envelope until planting time in your region.

KNOW YOUR PUMPKINS

Here's how to I.D. five varieties you're likely to find at garden centers, supermarkets and farmers' markets this time of year.

14
The Howden Your typical jack-o'-lantern pumpkin grows to about 20 to 30 pounds and is intensely orange.

15
Casper Pumpkin These white-skinned ornamental pumpkins have thick flesh—great for carving and painting.

16
New England Sugar Pie Pumpkin One of the standard varieties used for pies, these pumpkins have a fine, sweet flesh.

17
Jack Be Little These highly popular tiny pumpkins weigh in at just around 8 ounces. Party tip: they look super cute as table decor!

18
"Cinderella" Rouge Vif d'Etampes This deep red-orange, flat-looking pumpkin from France was the inspiration for Cinderella's carriage.

BISCUITS: BRIE PASSANO; STYLING: KELSEY BULAT (FOOD), SUE MITCHELL (PROPS). PRODUCTS: CAITLIN BENSEL. ILLUSTRATIONS BY EMMA DIBBEN

→ Get more pumpkin everything at *eatingwell.com/pumpkin*

OCTOBERFEST

Kick Back with a Cold One

Dogfish Head Punkin Ale is our favorite seasonal brew because it's made with real pumpkin (many aren't) and has just the right fruit-to-beer balance. Released right around September 1, it's usually gone by Thanksgiving—so get it while the getting's good. Pair it with sharp Cheddar, stuffing and turkey.

20-24 ESSENTIAL KITCHEN CARVING KIT

Forget those flimsy grocery store versions. Here are all the kitchen tools to round up:

A **boning knife** to cut out the lid.

An **ice cream scoop** for gutting small pumpkins or a **big metal spoon** for larger ones.

Cookie cutters (and a permanent marker) to trace shapes for carving.

A **paring knife** for carving details.

Scoop Up This Pumpkin Server
Perfect for stews, roasts and braises, the enameled cast-iron Staub 3.5-qt. Pumpkin Cocotte is the treat we want this Halloween. It also comes in 16- and 24-oz. sizes, just right for pumpkin desserts like bread pudding. ($180 for 3.5-qt.; $30 for 24-oz.; $25 for 16-oz.; *zwilling.com/us/staub*)

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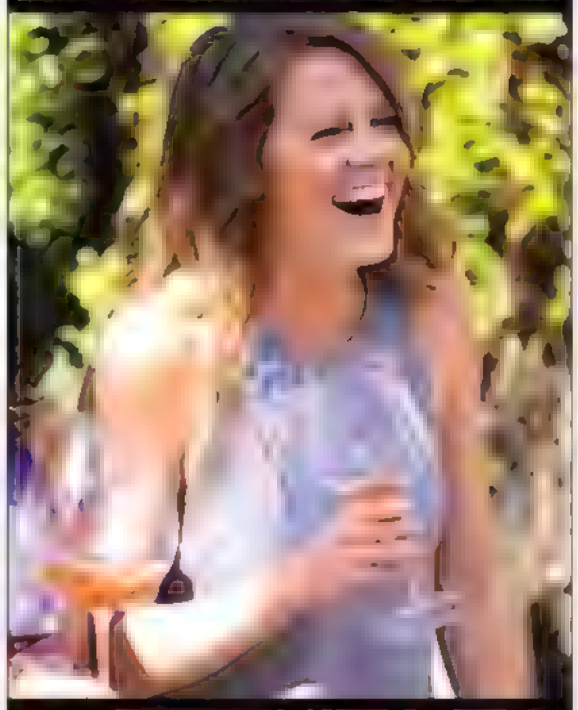
DRINK CLEAN



If you drink wine and care about your health, this is for you. We curate Natural Wines from small family farms and lab test each one for strict health criteria.

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Low Sulfite
Chemical & Additive Free
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RECIPE INDEX

WE HAVE STANDARDS
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		CALORIES	CARBS (G)	ADDED SUGARS (G)	PROTEIN (G)	FIBER (G)	SODIUM (MG)	POTASSIUM (MG)	CALCIUM (% DV)	FOLATE (% DV)	IRON (% DV)	VITAMIN A (% DV)	VITAMIN B12 (% DV)	VITAMIN C (% DV)	45 MINUTES OR LESS	GLUTEN-FREE	HEART-HEALTHY	LOW-CAL	VEGAN	VEGETARIAN
Side Dishes																				
51	Chile-Garlic Roasted Kohlrabi	76	7	0	2	4	120	401						118	■	■	■	■	■	■
51	Kohlrabi, Fennel & Apple Slaw	149	11	1	1	3	303	328						39	■	■		■		■
51	Kohlrabi Gratin	163	19	0	9	7	300	692	24					178				■		■
19	Mashed Cauliflower & Yukon Golds	77	11	0	2	2	211	399						61	■	■		■		■
44	Muhammara	129	10	0	3	2	126	218				40		134	■		■		■	■
16	Roasted Beets with Caraway & Crème Fraîche	230	12	0	2	3	308	379		26		26			■	■				■
18	Sautéed Chard with Lemon & Anchovy	106	6	0	3	2	261	466				127		35	■			■		
16	Spiralized Onions with Crispy Parmesan Breadcrumbs	102	13	0	3	2	231	154							■			■		■
Vegetarian																				
22	Buttermilk Fried Tofu with Smoky Collards	366	20	0	17	7	518	414	57	39		118		67	■			■		■
14	Butternut Squash & Piquillo Pepper Salad	289	18	1	6	6	421	437				272		34				■		■
26	Butternut Squash Soup with Apple Grilled Cheese Sandwiches	419	43	0	13	8	827	623	30			339		48	■			■		■
31	Chickpea Dumplings in Curried Tomato Sauce	454	41	0	12	13	438	805			22	48		100	■	■				■
40	Crispy Gnocchi with Tomatoes & Leeks	399	48	0	9	6	501	455				32		26	■					■
40	Crispy Gnocchi with Tomatoes, Leeks & Pesto	341	39	0	10	5	496	399				25		23	■			■		■
20	Linguine with Creamy Mushroom Sauce	479	59	0	17	7	409	1,026		21	21				■			■		■
47	Salsa & Beans Stuffed Baked Potatoes	259	43	0	7	11	439	1,005				442		49	■	■	■	■	■	■
Chicken																				
46	Chicken Curry Stuffed Baked Potatoes	257	30	0	22	5	240	754				440		75	■	■	■	■		
28	Golden Milk-Poached Chicken & Chickpea Salad with Broccoli	371	19	0	31	6	642	665		28		62		120	■	■		■		
34	Lemon-Garlic Chicken with Green Beans	296	11	0	27	4	652	519						23	■	■	■	■		
43	Piri Piri Chicken Thighs	210	4	0	20	2	205	302				29		23		■		■		
48	Salt & Vinegar Chicken & Brussels Sprouts	387	20	0	35	7	592	934		27		24		224	■			■		
Fish & Seafood																				
100	Baked Salmon with Charred Onions & Old Bay Radishes	324	7	1	29	2	718	653					100	23	■	■		■		
100	Black Bass with Sautéed Vegetables & Cioppino Jus	383	15	0	35	3	614	973				40		48		■		■		
100	Catfish with Sherry Vinegar Lentils	406	33	0	36	8	657	994					69		■	■		■		
40	Crispy Gnocchi with Tomatoes, Leeks & Shrimp	343	32	0	21	4	424	496				21			■			■		
46	Smoked Salmon Stuffed Baked Potatoes	256	43	0	11	4	231	1,107						34	■	■	■	■		
103	Steelhead Trout with Creamy Barley & Herb Salad	646	48	0	39	10	752	1,020			25	88	137	45						
Beef & Pork																				
46	BBQ Pork Stuffed Baked Potatoes	398	53	8	21	5	432	1,331						76	■	■		■		
47	Cheeseburger Stuffed Baked Potatoes	351	43	0	20	6	350	1,228					25	30	■	■	■	■		
24	Chipotle-Glazed Pork Tenderloin with Roasted Grapes	280	22	6	23	1	434	520							■	■		■		
32	Penne with Sausage, Squash & Chard	340	42	0	13	6	678	429				124			■			■		
47	Pesto & Egg Stuffed Baked Potatoes	422	43	0	17	7	547	1,598	20	49	31	138		51	■	■		■		
40	Pork Chops with Tomatoes & Leeks	304	11	0	20	2	438	591				32		27	■	■		■		
38	Sausage & Kale Skillet Pizza	429	49	0	22	3	787	177	22			23		23	■			■		
36	Seared Steak with Crispy Herbs & Escarole	244	10	0	26	8	394	1,111		48	21	57	21		■	■	■	■		
Desserts & Snacks																				
55	Almond & Pear Rose Tarts	186	20	2	3	2	77	57										■		■
111	Cocoa Pumpkin Seeds	238	11	6	9	4	24	21							■	■			■	■
111	Maple Spice Pumpkin Seeds	237	11	7	9	3	24	22							■	■			■	■
111	Old Bay Pumpkin Seeds	212	4	0	9	3	263	0							■	■			■	■
110	Pumpkin Spice Latte Cookies	128	16	10	2	1	100	42				28					■	■		■
111	Smoky Pumpkin Seeds	215	5	0	9	3	151	19							■	■			■	■
111	Vegan "Cheesy" Pumpkin Seeds	215	4	0	9	3	151	16							■	■			■	■
111	Za'atar Pumpkin Seeds	212	4	0	9	3	198	0							■	■			■	■
Pet Treat																				
112	Peanut Butter-Pumpkin Dog Biscuits	76	8	0	3	2	45	107							■		■	■		■

MAREN CARUSO

LIVINGWELL

YOUR GUIDE TO PRODUCTS, PROMOTIONS & SPECIAL EVENTS

HARISSA BAKED EGGS WITH CHICKPEAS, SPINACH, AND SUMAC

Karly Gomez, A Simple Pantry

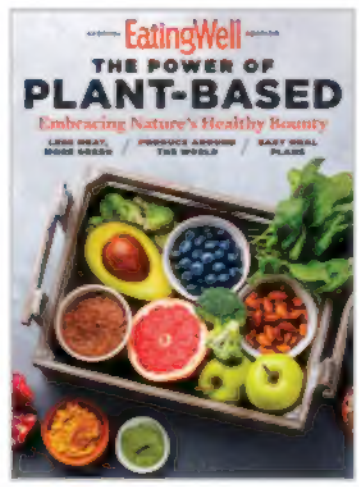
- 3 tbsp. olive oil, divided
- 4 cloves garlic, minced
- 1½ tsp. fresh thyme
- 1 16 oz can chickpeas, drained and rinsed
- 3 tsp. harissa paste
- 3 cups fresh baby spinach
- 1½ cups tomato puree
- 1½ cups petite diced tomatoes, drained
- 1½ tsp. red pepper flakes
- 4 **Eggland's Best Eggs**
- 1½ teaspoon sumac

1. Preheat oven to 375°F. Heat 2 tbsp. olive oil in a 10-inch, high-sided, oven-proof skillet over medium heat. Add the garlic and thyme and cook until softened and aromatic, but not browned, around 2 minutes.

2. Add the chickpeas and harissa and cook for 2 minutes, or until warm and thoroughly coated, then add the spinach, tomato puree, diced tomatoes, and red pepper flakes. Bring to a simmer.

3. Create 4 small wells in the top of the mixture then carefully crack an egg into each. Transfer skillet to oven and cook for 5-6 minutes, or until the whites have set but the yolks are still runny. Remove from oven, sprinkle with sumac and drizzle with remaining olive oil. Enjoy immediately.

Eggland's Best Eggs have delicious, farm-fresh taste plus 6x more vitamin D, 10x more vitamin E, and 25% less saturated fat than ordinary eggs. **EgglandsBest.com**.



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THERAPY FOR YOUR EYES

Keeping Farmland in the Family

Jillian Hishaw helps aging black farmers and other historically disadvantaged groups retain their land. **By Osayi Endolyn**

SEAN BUSHER

THE SITUATION

As a kid growing up in Kansas City, Missouri, Jillian Hishaw heard snippets of family lore about relatives who once had farms. But it wasn't until she was older that Hishaw discovered the devastating truth: her great-grandmother lost her Oklahoma farmland after being cheated by a lawyer. While pursuing a degree in agricultural law, Hishaw learned many farmers of color face similar challenges. For example, in separate lawsuits, federal judges ruled the U.S.D.A. systematically denied black and Native American farmers loans and disaster payments. Over the past century, black farmers have lost 80% of their land. Hishaw observed farmers of color were disproportionately affected by obstacles in transferring land ownership from generation to generation, often resulting in land loss. Now she's helping farmers take action to protect their land.

WHAT SHE DOES

Hishaw founded the nonprofit Family Agriculture Resource Management Services (F.A.R.M.S.) in 2013 to offer legal services focused on aging farmers of color. Funded primarily by grants and donations, F.A.R.M.S. works with a network of volunteers throughout the U.S. to provide legal advice, create wills and trusts, and represent farmers in court. She's especially concerned with farmers who've opted into Medicaid. They often don't realize that in the case of outstanding medical debt, the government can place a lien on the farm. "Some states have clauses and exemptions to protect small farmers," Hishaw says. "Most states do not." It affects so many people that Hishaw published a book about it: *Don't Bet the Farm on Medicaid*. F.A.R.M.S. also purchases produce from independent farms (putting dollars in the pockets of farmers) and donates it to rural communities in need—320,000 pounds to date.

WHY IT'S COOL

For a one-woman operation supported by volunteers, Hishaw has made quite an impact. The organization has helped dozens of farmers and their families protect more than 1,000 acres of land. "A couple of years ago we lost a lot of our vegetables and we were without crop insurance," recalls Tamie Burnell, who owns Burnell Farms in Royston, Georgia. "Jillian gave us vital information. She's also connected me with new business opportunities and revenue streams." Another day, another profitable farm kept in the family.

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